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ABSTRACT

This course guide is intended for classroom use by teachers of secondary level science to Spanish-speaking students of English as a second language (ESL). Both science instruction and acquisition of English scientific terminology are emphasized, within the framework of increasing overall student proficiency in English. The book is prefaced with a rationale to guide the teacher. Units present drills in repetition, substitution, and question answering. Topics covered include the metric system, matter and temperature, solutions, the microscope, the cell, mitosis, genetics, taxonomic classification, record breakers among animals, the human ear, the skeletal system, digestion, flowers and seeds, the structure of the earth, the water cycle, oceanography, astronomy, anthropology, and space exploration. Ample illustrations are provided,, laboratory activities are described, and Spanish translations of many assignments are provided to assist the student in mastering new terminology. (JB)

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TEACHING ENGLISH AS A SECOND LANGUAGE

A HANDBOOK

FOR

SCIENCE

Curriculum Bulletin Number 75CBM5, Item No. 33.4171

Secondary Level

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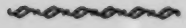

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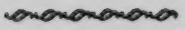

Billy R. Reagan, *General Superintendent*

INTRODUCTION - E.S.L. SCIENCE - GRADES 7-12

The lessons developed for this section deal with many of the specific areas of knowledge included in the regular curriculum for life and earth science. They will fill particular needs at specific points during a course. For instance, the lessons dealing with the metric system can be employed in their present forms when the math or science teacher has Spanish-dominant students in his class.

Beyond that kind of immediate utility, this handbook can be used as a source for various models of methodology and the specific application in science courses. For instance, if the science teacher has used the lesson on clouds, he can apply the same approach to many other concepts and bodies of information.

The teacher may refer to the General Introduction for a presentation of the basic philosophy and rationale of English as a Second Language methodology. Some of the approaches particularly pertinent to the science class are as follows:

1. Oral repetition to generate command of the terminology

2. Visual reinforcement where possible

3. Individual and small-group reinforcement

4. As little translation as possible (used economically and specifically if it will save a great deal of time)

5. Recombination of written elements toward, finally, the written response

Most of the lessons include Spanish translation - some of which can be duplicated and distributed for the student's individual use. Some are appropriate for oral bilingual presentation. (If the teacher is not bilingual, perhaps a bilingual student can present the oral Spanish translation.) All of the lessons can be adapted to E.S.L. methodology.

The teaching of science incorporates the visual representation of concepts and operations probably more than any other subject. Charts, graphs, scales, drawings (representing objects, processes, comparisons, measurements) are important components of any science class. The science teacher will be proficient in the use of visuals as reinforcement. Such emphasis is appropriate for the linited-English speaker. He can perform many of the activities in spite of his limited vocabulary and limited grasp of English sentence structure.

The teacher may find that a preliminary presentation and then repetition of some of the basic sentence structures that will be used in the science class (how are questions asked? how are they answered?) will make it more possible for the student to assimilate information.

Further, the spacial and temporal concepts used in science are probably so familiar to most students that a little time devoted to repetition and reinforcement of the vocabulary will be well spent. When the student has command of a few basic sentence structures and of the vocabulary within a particular domain or segment, he can respond and discuss. His confidence and enthusiasm are bolstered by each new assurance of his English competency. He can <u>do</u> the lab work and the drawing; he can <u>answer</u> simple questions referring to a drawing; he can <u>make</u> the models. He is participating.

TABLE OF CONTENTS

	Page
Introduction.	iii
General Introduction to Series.	vii
The Metric System	1
Matter and Temperature.	8
Solutions	15
The Microscope.	20
The Cell.	24
Mitosis - Cell Division	31
Genetics.	36
Classification.	44
Record Breakers Among Animals	57
The Human Ear	63
The Skeletal System	66
Digestion	71
The Flowers and Seeds	83
The Structure of the Earth.	91
The Water Cycle	98
Oceanography.	109
Astronomy	113
Anthropology.	120
Space Exploration	128
Bibliography.	133

GENERAL INTRODUCTION

Many secondary schools in the Houston district have significant enrollments of non-English speaking students or students who have limited English-speaking ability. Administrators and teachers have an immediate need for materials and programs appropriate for the student whose dominant language is not English. This handbook is published to answer some of those needs, primarily of the non-English speaker, but secondarily, of the student who is bilingual. Finally, many of the materials are appropriate for all students — in content areas, in cultural awareness, in oral language training.

Houston has a large enrollment of students with Spanish surnames. Their origins and histories are as varied as those of any other group of students. Within the 18 percent estimate of students with Spanish surnames, the variety of language and cultural experience is very complex. The materials presented here are designed specifically for those students who are relatively recent arrivals in the United Stuates and who are unable to function normally in the regular classroom conducted entirely in English.

The lessons presented can, in many instances, be employed within the regular curriculum. For instance, the science teacher can refer to the lesson on cell mitosis as a guide in his preparation, or the lesson can be copied and distributed directly to the students. Further, the methodologies and models represented in the lessons can be utilized in other presentations. The lessons are models of the various approaches which are appropriate for the student with limited English.

The Summer Bilingual-Bicultural Institute

This handbook was compiled as part of the Title III Bilingual-Bicultural Program during the summer of 1974. Twelve teachers from the Houston Independent School District participated in the project which involved training in English as a Second Language methodology, curriculum development, and actual teaching experiences.

Specialists in linguistics and bilingual-bicultural education presented two weeks of workshops designed to introduce basic concepts and strategies within their fields. Ana Chamot of the University of Texas, Lupita Quintanilla of the University of Houston, and the representatives of the Center for Public Schoo! Ethnic Studies, based in Austin, offered their knowledge and experience with a degree of enthusiasm and innovation that helped create a unity of purpose among the teachers in the program.

Students with limited English proficiency volunteered to attend four weeks of classes in language arts, history, mathematics, and science. Each student was exposed to a presentation in each content area every day. The structure required that each presentation be analyzed and evaluated for its appropriateness, effectiveness, and relevance. Such evaluation was required of the teacher presenting the materials, of other teachers in the program, and of the students. Lessons were accepted, revised, or rejected, based on such evaluation. Teachers who participated in the program were chosen from various fields: science, mathematics, Spanish, English as a Second Language, history, English, reading.

Because time was short and needs were great, teachers and students made daily assessment of what should have priority. Exact definitions of goals and efficiency of effort to achieve them were necessary to the success of the program. We hope that such bases are reflected in the handbook.

Content and Organization

This handbook is composed of four major units designated by content area: Language Arts, Mathematics, Science, and History-Social Studies. Because of the nature of the information within the various content areas, length and complexity of the lessons will vary. Some lessons contain one central activity; others have several activities to achieve the educational objective.

The General Introduction contains a section describing activities and methodologies appropriate for teaching any information as English as a Second Language (E.S.L.) Further, each content area division is preceded by a brief introduction with suggestions for that particular subject matter.

The user of the handbook should note that several lessons are cross-referenced between two content areas. He should also be aware that a perusal of the entire handbook will offer a broad view of approaches and methodologies that are appropriate for his particular classes (or a portion of his classes).

Some of the lessons are structured entirely in English, using the E.S.L. approach; others contain a minimal amount of Spanish; others are bilingual. Translations are supplied primarily for those situations in which a teacher has a small percentage of students with limited English ability. In many cases, the student can work on his own, employing if possible both the Spanish and English versions. This handbook is designed for teachers who seek practical, efficient, and productive plans for the student whose dominant language is other than English. It is hoped that the handbook will be a source and a model for such plans.

Materials and Equipment

Most of the lessons included in the handbook emphasize visual representation, where possible, to impart vocabulary and concepts in the most efficient way possible. The teacher who is aware of the power of visual reinforcement will collect, buy, create all manner of visual aids:

Photographs
Pictures and drawings from magazines
Pictures and drawings from old books
Pictures and drawings from newspapers
Posters
Transparencies
Filmstrips (commercial or self-made)
Films
Flashcards and sentence strips, charts, etc.

Visual stimuli accelerates the learning of oral language. Because mastery of the oral language is the first priority of the second language learner, *written seatwork without oral preparation should be avoided.*

Finally, the most important visual stimuli in any second language classroom are facial expression and gesture, not only as clues to the student, but in many cases as integral parts of communication.

Probably the two pieces of equipment most beneficial to the teacher and student in a language-learning environment are the tape recorder and the overhead projector. Commercially-made tapes are available for English as a Second Language. (See the attached bibliography.) Further, teachers within the content areas can create tapes for the specific needs of

their students. They might concentrate on the pronunciation of a specialized vocabulary or explanation of a process (using simple structures in English). The variety of possibilities depends upon the nature of the subject and the time the teacher can allot to the preparation of tapes. Tapes, of course, facilitate individual or small group work. The overhead projector and transparencies lend flexibility and variety to the use of visual materials.

Physical Structure of the Class

The primary difficulty for the teacher in many classrooms is that unrealistic schedules and overcrowded classrooms make it impossible for him to reach all of the students and their individual needs. When the teacher finds, in addition to that, students scheduled into his class who do not speak English, he is confronted with further challenges to his versatility and sensitivity. For the particular needs of the non-English speaking students, there are several structures or physical sets possible.

For instance, the teacher will immediately enlist the aid of any bilingual students to help with the monolingual Spanish student. That, of course, will work best on a one-to-one basis, and will probably benefit both students.

Further, during large group work, if the English-speaking students are exposed to Spanish, either in the giving of directions or the actual imparting of information, they will certainly benefit from the linguistic enrichment. Some of the possible physical groupings are those appropriate for most classroom situations:

Teacher directed: large groups, small group, individual

Peer directed: small group, one-to-one

Self-directed

Methodology

The basic philosophy of teaching English as a Second Language is based upon several premises which are true of any language learning – that is;

1. Listening and speaking skills are achieved prior to reading and writing skills.
2. Oral language is achieved through intensive oral practice and reinforcement.
3. The learning of a foreign or second language (especially in the nature of the sequence) is comparable to the learning of a native language.
4. Mastery of the language necessary for the most immediate needs of the students (certain domains, situations, etc.) is prior to, but not to the exclusion of, the mastery of extensive vocabulary, verb declensions, etc.
5. The target language is the language of instruction.

The following are several essential approaches to the teaching of English as a Second Language:

Repetition

Used for vocabulary and structure drill, expression and intonation. The teacher models; the student repeats, using as nearly as he can the same intonation, pronunciation, stress,

and pause that he has heard. The teacher will elicit the repetition from the whole group, part group (e.g., rows, individuals, or certain identifiable sets [girls, boys, everyone wearing red, etc.]).

The teacher will find that the use of particular gestures will increase the success of repetition drills and other oral drills. He should develop and train the students to recognize certain gestures that indicate *listen only*, *repeat*, *substitute*, *transform* (change), etc.

Substitution

The students are given the model of a basic structure. It is repeated by the students. The teacher then provides a substitution item to be inserted into the same structure:

Teacher:	This is *an* auditory nerve.
Students:	This is an auditory nerve.
Teacher:	auditory canal.
Students:	This is an auditory canal.
Teacher:	This is *a* hammer.
Students:	This is a hammer.
Teacher:	stirrup.
Students:	This is a stirrup.

In the drill shown above, the student is practicing a structure that is essential in English; he is learning the distinction between the use of the articles "a" and "an"; he is practicing the vocabulary necessary to the study of the human ear. This particular drill, of course, would be accompanied by a line drawing, a model, or some other visual representation of the ear.

In any kind of oral drill, it may be necessary to break into small units an unusually long utterance. One term for this kind of drill is "backward buildup":

Teacher:	The largest amphibian is the Japanese Salamander.
Students:	(Listen only.)
Teacher:	the Japanese Salamander.
Students:	the Japanese Salamander.
Teacher:	amphibian is the Japanese Salamander.
Students:	amphibian is the Japanese Salamander.
Teacher:	The largest amphibian is the Japanese Salamander.
Students:	The largest amphibian is the Japanese Salamander.

Although it might seem that such efforts would be intimidating to secondary students, they are not if they are introduced with a positive, enthusiastic attitude. The teacher might find, in fact, that such methods are entirely appropriate for any student learning new vocabulary.

Transformation

This drill involves basic transformations of the structure:

(Statement-Question)

Teacher:	Velasco is the president of Perû.
Students:	(Listen only.)
Teacher:	Is Velasco the president of Perû?
Students:	(Listen only.)
Teacher:	Henry Kissinger is the Secretary of State.
Students:	Is Henry Kissinger the Secretary of State?

Such transformation drills can be employed for the practice of positive-negative, question-answer, present-past, singular-plural, etc.

Memorization

The process of memorization, of course, occurs along with repetition, recombination, and the emphasis upon relevant information. One process which is appropriate for large group mastery of a passage or a dialogue is that in which the students see the preliminary graphic representation of the words (written on the chalkboard). The dialogue can include information within a particular content area:

Juan:	Did you go to Mrs. Martin's class today?
Joan:	Yes, we have a test tomorrow on astronomy.
Juan:	Oh, no! I don't remember the planets.
Joan:	Which one has the ring of gases?
Juan:	I think it's Pluto. . . .
Joan:	No, it's Saturn. Pluto is the furthest from the sun.

The teacher drills the class on the pronunciation of difficult words. He then has the class repeat the lines several times together. Then, he begins to erase articles, pronouns, etc., and finally the key words, until the students can repeat the entire dialogue without the aid of the written word.

Finally, parts of the class or individuals can deliver entire lines.

Directed Questioning

The teacher instructs one individual to question another. This can be a practice of the structure of questioning and answering only, using a dialogue of social situation; or it may be another method of drilling and reviewing information within the content areas:

Teacher: (To Student 1) Ask Marfa if stratus clouds are dome-shaped.

Student 1: Maria, are stratus clouds dome-shaped? (The student is changing the structure of the sentence he has been given as a clue.)

Marfa: No, stratus clouds are not dome-shaped. They are flat and form in layers.

Teacher: (To Student 3) Ask Gwen which clouds bring stormy weather.

Student 3: Gwen, which clouds bring stormy weather?

Gwen: Cumulonimbus clouds bring stormy weather.

(Such an exercise will necessitate prior drill and repetition using the various structures the students will need for their responses- question structures using *do, does, is, are, who, what, when, where,* etc.)

Guided Discussion

This process can be used after the students have a reasonable command of the vocabulary of a particular lesson, unit, concept, etc. The teacher provides a list (on the board, the overhead, or a chart) of possible structural or vocabulary elements necessary to make meaningful questions or statements about a particular subject. The student will choose appropriate statements from each column to discuss each type:

Cloud Types	Appearance	Height	Kind of Weather
cumulus	dome-shaped	25,000 ft.	winter
cumulonimbus	wispy	75,000 ft.	changes
cirrus	huge	2 - 4 miles	storms
stratus	thin	low	calm
	billowy		heavy rains
	dark		fair weather
	layers		
	thunderheads		
	fog		
	fluffy		

It may be necessary to model appropriate structures for the oral narration:

_____ clouds are (appearance).

They form at (height).

_____ clouds indicate (kind of weather).

The Sounds of English and Spanish

The student who is studying a second language will tend to superimpose the sound system of his native language over the sound system of the second language. In the case of the Spanish speaker learning English, there are many sounds which do mesh and therefore will offer positive influence. Although the sound may not be articulated in exactly the same manner in both languages, the speaker will be understood. Some such sounds are p, t, d, k, g, ch, f, s, m, n, l, y, w, iy, ey, e, a, ay, aw, oy, ow, uw.

Certain sounds substituted from the Spanish system to the English will result in "negative interference"; that is, the English word will be distorted so that it will be misunderstood or unintelligible. Such distortion occurs when the sounds of Spanish vowels are substituted for the English vowels (though some of those do transfer positively). Other English sounds affected in this way are b, v, h, r, z.

Some English sounds do not exist in the Spanish system. Those are the most difficult for the student to master. Such sounds are said to have "zero interference." Some are j, th, sh, zh (as in *pleasure*), ng, i, ae (as in *ask*), ɔ (as in *done*), ô (as in *caught*), u (as in *look*).

Sound Discrimination Drills

The teacher who is aware of the particular points of interference between the sound systems of English and Spanish will be able to approach the problem directly with oral sound discrimination drills. The most effective kind of practice is the Minimal Pair Drill. Minimal pairs are sets of words with a difference of one sound between them. The English word with the sound nearest to the Spanish should be listed first; the sound which will be more difficult for the Spanish speaking student is contrasted as follows:

mean - mine	meal - mile	eat - it
reel - rile	tear - tire	leak - lick
peal - pile	fear - fire	
cheese - she's	chair - share	low - law
cheap - sheep	catch - cash	Joe - jaw
chew - shoe	watch - wash	sew - saw
		hold - hauled
few - view	fine - vine	
fear - veer	file - vile	
	ferry - very	

Such lists of minimal pairs can be compiled to distinguish and practice sounds in English. Some possible activities for employing the minimal pairs are:

1. Oral drill - the teacher models the pronunciation.

2. Oral drill with visuals or gestures - the students distinguish the sounds and the meaning.

3. Oral reading (listening only) - students pronounce the words from the written form after the teacher models.

4. Listening discrimination - after the teacher pronounces the word, the students will hold up either one or two fingers to indicate the sound they have heard. (This should be done rapidly.) For individual evaluation, the student will write the number to signify the sound.

5. Dictation - the teacher reads the words from minimal pairs already practiced. Students write what they hear.

6. Oral or written practice in context - the teacher will give two utterances, such as:

   It is a gold *mean*.
   It is a gold *mine*.

   Will you sit in your *chair*?
   Will you sit in your *share*?

   The teacher asks which is correct. Students can respond orally or in writing, depending upon their mastery.

7. Sound and vocabulary mastery - after the students have mastered the sounds and the meaning, they can be asked to do more creative tasks, such as composing short statements or questions using the minimal pairs. They can create their own discrimination games and challenge the other students.

(Many of the sources listed in the bibliography contain minimal pair lists.)

The Structures of English and Spanish

Just as the Spanish speaker will tend to graft his phonetic system onto the English system, so will he tend to use Spanish structure for English utterances.

The following examples demonstrate how such interference will affect the English utterance:

	Spanish Structure	*Effect in English*
1.	The adjective is often placed after the noun.	It is my coat blue.
2.	The indirect and direct object pronoun are often placed before the verb.	Him (to him) I give the book.
3.	Spanish does not have an equivalent to the *do* and *does* of English.	You want to go?
4.	Spanish does not have an equivalent of the neuter pronoun *it*.	Is very cold.

5.	The subject pronoun is not always expressed in Spanish because the verb inflection makes it understood.	Am sad.
6.	Statements of the possessive in Spanish are not always parallel to the English structure.	That is the house of Joe.
7.	Formation of the negative in Spanish does not correspond to the English structure.	He no can go.
	The double negative is common in Spanish.	He no see nothing.
8.	Article usage in Spanish varies from English structure.	The Mr. Johnson is the principal. My mother is teacher.
9.	Formation of the interrogative in Spanish does not correspond always with the English.	Is cooking your dinner? Is teacher his mother?
10.	Preposition usage in English and Spanish is not exactly parallel.	I live in Malone Street.
11.	Spanish does not employ inflections of the adjective for comparative and superlative forms.	Mary is more tall than Alice.

There are many other differences between the structures of English and Spanish, which will be reflected in interferences. (Please refer to the bibliography for references to the Stockwell and Bowen books.)

To guide the student in his practice of the morphology and syntax of English, the teacher can employ the kinds of drills and activities discussed in this introduction: repetition, substitution, etc.; the drill and practice will elicit the four language skills – listening, speaking, reading, writing.

Writing Skills

The kind of writing that any student does in the classroom will ultimately depend upon the nature of the subject and the priorities established by the teacher. The pattern is altered somewhat in the case of the student with limited English ability. His limitations will probably require the special attention of the teacher.

In E.S.L. methodology, there is a major concern that oral mastery should be previous to the written task. That guideline is effective in an oral language classroom where the emphasis is upon a sequential development of a second language. The realities of the content area classroom will sometimes necessitate a divergence from, or suppression of, such an ideal. It is preferable, however, to prepare the student with the visual and oral recognition before he is required to learn through the written word. That is not always possible.

There is a counterpoint to the stressed guideline. That is, the written task is a valuable reinforcement of the oral mastery. Again, modeling the correct form, as in oral learning, is a necessary introduction to the writing assignment.

Translation assignments should be avoided except for lists of nouns or adjectives which do not involve the mastery of English inflections.

These kinds of writing assignments are especially appropriate for students with limited English ability:

1. *Copying* – of vocabulary, dialogues, short paragraphs, diagrams and labels, etc.

2. *Dictation* – as reinforcement and evaluation of material mastered orally.

3. *Rewriting a dialogue into a narrative* – to practice the use of verb tenses (the teacher can specify present, present progressive, past, etc.) and relative pronouns.

   Example:

   Juan: Did you go to Mrs. Martin's class today?

   Joan: Yes, we have a test tomorrow on astronomy.

   Depending upon the instructions, the student will convert the conversation to a narrative form:

   Juan asked Joan, "Did you go to Mrs. Martin's class today?" Mary said that she had gone. She told him that they would have a test tomorrow on astronomy.

4. *Guided Composition* – to give the student written command of clusters of information. It is a follow-up to the "Guided Discussion" in oral language development.

5. *Dictation-Composition* – to incorporate the listening, reading, and writing skills in one task. Again, such an activity is subsequent to the oral practice. The teacher will read a passage several times. Students listen carefully for key words and for structure and sequence. The teacher then elicits from the student(s) the written form of key words, giving guidance when necessary. Students will then recompose the passage, using the written keys.

6. *Recombination* – to practice the use of adjective placement, compound and complex sentence structure, etc.

   Example:
   The nucleus is the center of the cell.

   The nucleus is the main control of the cell.

   The nucleus is the control center of the cell.

   The mirror is located below the stage of the microscope.

   The mirror reflects the light across the opening.

   The mirror, which is located below the stage, reflects the light across the opening of the microscope.

Phrases for the Classroom

The expressions listed here are usually appropriate and necessary for conducting classes. The teacher may wish to give students copies of the translated list. Oral practice of the English phrases will ultimately benefit the teacher and the students.

Come in.	entre(n)*, pase(n), por favor
Sit down.	siénte(n)se
What is your name?	¿Cómo se llama Ud?
What is your address?	¿Qué es su dirección?
What is your telephone number?	¿Qué es su número de teléfono?
Please sit here.	Siéntese aquí, por favor.
Open your books.	Abran sus libros.
Turn to page _____	Pasen a la página _____ .
Take out your pens.	Saquen sus plumas.
Take out your pencils.	Saquen sus lápices
Take out a sheet of paper.	Saquen una hoja de papel.
Take out your notebooks.	Saquen sus cuadernos.
Repeat.	Repita(n).
Listen.	Escuche(n).
Read.	Lea(n).
Write the answers.	Escriban las respuestas.
This is a test.	Ésta es una prueba.
Turn it in in _____ minutes.	Entréguenmelo en _____ minutos.
Review the lesson.	Repase(n) la lección.
Ask Joe _____ .	Pregúntele a Pepe _____ .
Do it in groups of _____ persons.	Hágalo en grupos de _____ personas.
Come here, please.	Ven acá, por favor. Véngase aquí, por favor.
Close the door.	Cierre(n) la puerta.
Please be quiet.	Silencio, por favor.
Answer the question.	Conteste(n) la pregunta.

*The command forms ending with *n* are plural.

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THE METRIC SYSTEM

Level:

Grades 7 - 12

Objectives:

Student will be able to associate the English terminology of the metric system with that of the Spanish language.

Student will be able to abbreviate the terms for the units of measurement of the metric system.

Student will be able to determine how many millimeters, centimeters, and decimeters there are in a meter.

Level of Communication:

Individual or large group

Procedure:

1. Student will associate the English words for the units of measurement with those of the Spanish language.

   How do you say one thousand in Spanish? _____(mil)

   How do you say one hundred in Spanish? _____(cien)

   How do you say ten in Spanish? _____(diez)

English		Spanish	Abbreviations
meter		metro	m
millimeter		milímetro	mm
centimeter		centímetro	cm
decimeter		decímetro	dm
1 meter	=	1000 millimeters	
	=	100 centimeters	
	=	10 decimeters	

2. Student will draw a meter on small scale and divide it into 100 equal parts, designating centimeters and decimeters.

3. Students will respond orally with negative and positive statements relating to the measurements being drilled.

4. Student will write responses to Exercise No. 2.

5. Student will work individually or with a group to complete Exercise No. 1 (at end of unit), demonstrating their understanding of the manipulation.

Materials:

Metric ruler
Exercises attached

Evaluation:

An exercise similar to No. 1 may be given as an evaluation.

Oral Drills:

Student will repeat answers as often as necessary until command is achieved. Student will answer all questions in complete sentences for the best possible reinforcement of the structure. If a student makes an error in his pronunciation, elicit the correction immediately. (Oral correction in a group situation calls for a tactful approach.) Elicit answers from individuals or groups, or divide the class as you feel is appropriate as the oral drill progresses.

Statement

Teacher: Repitan, por favor. (Please repeat.)

One meter is equal to 1000 millimeters.

Student: One meter is equal to 1000 millimeters.

Juan: One meter is equal to 1000 millimeters.

Maria: (Individuals and/or groups, as designated by the teacher, continue repeating the same statement.)

Positive Answer

Teacher: Contesten, por favor. (Answer, please)

Is one meter equal to 1000 millimeters?

Yes, one meter is equal to 1000 millimeters.

Student: (Listen only.)

Teacher: Is one meter equal to 1000 millimeters?

Student: Yes, one meter is equal to 1000 millimeters.

(Continue with individuals and/or groups, as above.)

Negative Answer

Teacher: Contesten, por favor, con "no." (Answer, please, with "no.")

Teacher: Is one meter equal to 1200 millimeters?

No, one meter doesn't equal 1200 millimeters.

Student: (Listen only.)

Teacher: Is one meter equal to 1200 millimeters?

Student: No, one meter doesn't equal 1200 millimeters.

(Continue with individuals and/or groups, as above.)

Free Question

Teacher: Contesten, por favor. (Answer, please.)

How many meters equal 1000 millimeters?

Student: One meter equals 1000 millimeters.

Teacher: How many millimeters equal one meter?

Student: One thousand millimeters equal one meter.

Replacement Drill:

Teacher: One meter is equal to 1000 millimeters.

2000

Two meters are equal to 2000 millimeters

Student: (Listen only.)

Teacher: One meter is equal to 1000 millimeters.

Student: One meter is equal to 1000 millimeters.

Teacher: 2000

Student: Two meters are equal to 2000 millimeters.

Teacher: 100 centimeters

Student: One meter is equal to 100 centimeters.

(Continue substituting and drilling until most of the students respond readily.)

NOTE: Practice periods should be short and interest should be maintained by varying the drill and by using visual aids.

EXERCISE NO. 1

In science many of the things we measure are in the metric system rather than in the English system.

I. The English Measuring System

How well do you know the units of the English Measuring System? Try to answer the following problems:

1 foot (ft) = _____ inches (in)

1 yard (yd) = _____ ft

1 yd = _____ in

1 mile = _____ ft

II. The Metric System

1 meter (m) = 1000 millimeters (mm)

1 meter = 100 centimeters (cm)

1 meter = 10 decimeters (dm)

Change the following by using the table above:

1. 3 m = _____ mm
2. 4 m = _____ cm
3. 2 m = _____ dm
4. 9 m = _____ cm
5. 8 m = _____ dm
6. 6 m = _____ mm
7. 5 m = _____ cm
8. 7 m = _____ dm
9. 300 cm = _____ m
10. 90 dm = _____ m
11. 8000 mm = _____ m
12. 700 cm = _____ m
13. 10 dm = _____ m
14. 6000 mm = _____ m
15. 500 cm = _____ m
16. 20 dm = _____ m

EXERCISE NO. 1
(Spanish Translation)

En las ciencias, muchas de las cosas que medimos están en el sistema métrico y no en el sistema inglés.

I. El sistema inglés para medir:

Contesten, por favor.

un pie	=	_____	pulgadas
una yarda	=	_____	pies
una yarda	=	_____	pulgadas
una milla	=	_____	pies

II. El sistema métrico:

	(es igual a)		
un metro (m)	=	1000 milímetros	(mm)
un metro	=	100 centímetros	(cm)
un metro	=	10 decímetros	(dm)

Cambie los siguientes con el uso de la escala del sistema métrico.

1.	3 m = _____ mm	9.	300 cm = _____ m
2.	4 m = _____ cm	10.	90 dm = _____ m
3.	2 m = _____ dm	11.	8000 mm = _____ m
4.	9 m = _____ cm	12.	700 cm = _____ m
5.	8 m = _____ dm	13.	10 dm = _____ m
6.	6 m = _____ mm	14.	6000 mm = _____ m
7.	5 m = _____ cm	15.	500 cm = _____ m
8.	7 m = _____ dm	16.	20 dm = _____ m

EXERCISE NO. 2

Answer the following questions in complete sentences.

Favor de contestar en oraciones completas.

1. Is one meter equal to 1000 millimeters?

2. Is one meter equal to 1200 millimeters?

3. How many meters equal 1000 millimeters?

4. How many millimeters equal one meter?

5. Is one meter equal to 100 centimeters?

6. Is one meter equal to 150 centimeters?

7. How many meters equal 100 centimeters?

8. How many centimeters equal 1 meter?

9. Is one meter equal to 10 decimeters?

10. Is one meter equal to 12 decimeters?

11. How many meters equal 10 decimeters?

12. How many decimeters equal one meter?

Please repeat in Spanish (Repita en Espanol)

Metro Milímetro Centímetro Decímetro

Name (su nombre)_____

MATTER AND TEMPERATURE

Level:

Grades 7 - 9

Objectives:

Student will be able to classify matter as *element*, *compound*, and *mixture*.

Student will be able to identify the three physical states of matter as *solids*, *liquids*, and *gases*.

Student will be able to read temperature on two scales - *Farenheit* and *Celsius*.

Level of Communication:

Individual, group

Procedure:

This lesson may be presented in one or both of two ways.

1. The teacher may give the student the exercise sheet on matter, in either the Spanish or English version, along with the temperature conversion scale so he can read and work on them individually.

2. The teacher may present the lesson orally in Spanish and/or in English as a formal explanation of the material on the exercise sheet.

3. The E.S.L. methodology suggests the use of the backward build-up method for teaching the definitions of *element*, *compound*, and *mixture*, using pictures of salt, rock, blood, cookie, etc., during the oral drills.

4. The teacher will say the names of the parts of the thermometer and have the student repeat the names as he points to the parts.

   Teacher: Cylinder

   Student: Cylinder

5. Using the drawing of a thermometer on a large poster or on a transparency, the teacher may conduct an oral drill using the following concepts and identifications:

   Thermometers are made with mercury or alcohol.

   Mercury thermometers are silver.

Alcohol thermometers are red.

The body temperature is 98.6° F.

The body temperature is 37.5° C.

Water boils at 212° F.

Water boils at 100° C.

Water freezes at 32° F.

Water freezes at 0° C.

NOTE: The repetition should be varied, depending on needs. You may call on individuals to repeat or on groups of two's and four's. You may simply want to divide the room and have each portion repeat as a group.

6. When most of the students have mastered the pronunciation, ask direct questions covering the information in the oral drill:

   What color is a mercury thermometer?

   At what temperature does water boil?

   (Use the drawing to cue answers.)

Materials:

Exercise sheets on matter and temperature
Temperature conversion scale
Two sketches of a thermometer - one mercury and one alcohol
Cutout pictures (from magazines) of rocks, salt, cake, etc., for teaching compounds, elements, and mixtures, as well as solids, liquids, and gases

Evaluation:

The exercise on matter may be given for the purpose of evaluation.

EXERCISE SHEET

MATTER

Introduction:

All matter, organic and inorganic, may be classified as an *element*, a *compound*, or a *mixture*.

An *element* is a substance which cannot be broken down into simple substances; for example, gold, silver, iron.

A *compound* is a substance composed of two or more elements joined together so that they cannot be separated easily; for example, water (hydrogen and oxygen - two gases), salt (sodium and chlorine).

A *mixture* contains two or more substances mixed together but not joined chemically; for example, soil, blood, seawater.

Procedure I. Tell what each of the substances listed below is: (a) an element, (b) a compound, or (c) a mixture.

1. cake	_____	5. water	_____
2. salt	_____	6. blood	_____
3. gold	_____	7. paper	_____
4. soil	_____	8. cookie	_____

Matter is also classified by its physical state. The three physical states are liquid, gas, and solid. Most substances can exist in all three physical states.

Procedure II. Tell whether these various states of matter are solid, liquid, or gas:

1. water	_____	5. rock	_____
2. blood	_____	6. hydrogen	_____
3. oxygen	_____	7. ice	_____
4. wood	_____	8. carbon dioxide	_____

TEMPERATURE

Introduction:

Temperature is usually measured with a thermometer containing a column of mercury or colored alcohol inside a tube. Thermometers are marked in standard units called degrees. Temperature is important in your environment. Food can spoil easily at temperatures higher than 50° F. or 10° C. Therefore, we refrigerate many foods.

The migration of birds, sprouting of seeds, bacterial growth, hibernation

of animals, and agricultural methods are all influenced by temperature.

You are familiar with the *Fahrenheit* temperature scale which is used in the U.S. At one atmosphere of pressure, 32° F. is the freezing point of water. The *Celsius* temperature scale is used by scientists throughout the world. At one atmosphere of pressure, 0° C. is the freezing point and 100° C. is the boiling point of water.

Procedure

1. Change the temperatures below using the two scales in the chart attached at end of this unit.
2. Look at column C° or F° (whichever you already know); then look across to the other side and find the temperature in the opposite scale. Example: Look at 50° F.; now look across the chart to see what it is in Celsius. It is 10°.

50°	F.	=	10 ° C.	95°	F.	=	° C.
113°	F.	=	° C.	167°	F.	=	° C.
131	F.	=	° C.	25	C.	=	° F.
98.6	F.	=	° C.	95	C	=	° F.
200	F.	=	C.	80	C	=	F.

EXERCISE SHEET

MATERIA
(Spanish Translation)

Introducción:

Toda materia, orgánica o inorgánica se clasifica como *elemento*, un *compuesto*, o una *mezcla*.

Un *elemento* es una sustancia que no se puede descomponer o transformar en cambios químicos. Ejemplos: oro, plata, hierro

Un *compuesto* es una sustancia hecha de dos o más elementos juntos para que separación no sea fácil. Por ejemplo: agua (los elementos son oxígeno y hidrógeno), sal (los elementos son sodio y cloro).

Una *mezcla* es un material formado por dos o más sustancias que no están combinadas químicamente. Ejemplos: tierra, sangre, agua de mar.

Procedimiento: Indique si cada una de las sustancias siguientes es (a) un elemento, (b) un compuesto, o (c) una mezcla

1. aire _____
2. agua de mar _____
3. agua _____
4. vapor _____
5. piedra _____
6. hierro _____
7. papél _____
8. mercurio _____
9. hielo _____
10. gasolina _____

La materia está clasificada por su estado físico también. Los tres diferentes estados de la materia son sólido, líquido, y gaseoso.

Procedimiento: Indique si los siguientes estados de materia son sólidos, líquidos o gaseosos.

1. agua _____
2. sangre _____
3. oxígeno _____
4. madera _____
5. piedra _____
6. hidrógeno _____
7. hielo _____
8. anhídrido carbónico _____

TEMPERATURA

Introducción:

La temperatura se mide con un termómetro que contiene un cilindro de mercurio o alcohol colorizado. Los termómetros están marcados en unidades de grados. La temperatura es muy importante en su ambiente.

Procedimiento:

1. Cambie las temperaturas siguientes, usando las dos escalas (Fahrenheit-Centígrado).

2. Las dos medidas de temperatura se puede encontrar en las columnas C^{o} y F^{o}. Por ejemplo, busque el nivel que compara con 50^{o} F. Está en la columna opuesta (10^{o} C).

F Fahrenheit				C Celsius (Centígrado)			
50^{o} F.	=	10 ^{o}	C.	95^{o} F.	=	^{o}	C.
113^{o} F.	=	^{o}	C.	167^{o} F.	=	^{o}	C.
131^{o} F.	=	^{o}	C.	25^{o} C.	=	^{o}	F.
98.6^{o} F.	=	^{o}	C.	95^{o} C.	=	^{o}	F.
200^{o} F.	=		C.	80^{o} C.	=		F.

TEMPERATURE CONVERSION SCALE

ESCALA DE CONVERSIÓN DE TEMPERATURA

°C		°F	
100°	Boiling Punto de hervir	212°	
95°		200°	
90°		194°	
85°		185°	
80°		176°	
75°		167°	
70°		158°	
65°		149°	
60°		140°	
55°		131°	
50°		122°	
45°		113°	
40°		104°	
37,5°	Body Temperature Temperatura del cuerpo	98,6°	
35°		95°	
30°		86°	
25°		77°	
20°		68°	
15°		59°	
10°		50°	Example Ejemplo
5°		41°	
0°	Freezing Punto de helar	32°	

SOLUTIONS

Level:

Grades 7 - 9

Objective:

The student will be able to demonstrate that a solution is composed of a solute which is dissolved in a solvent.

Level of Communication:

Individual or group

Procedure:

The teacher will furnish each student a copy of the lab sheet on solutions which contains some experiments. (Spanish or English as needed)

The student may work by himself on the experiments by reading the information and instructions.

The teacher may give a class demonstration of the experiment and have the entire class work on the experiments.

Materials:

Container of water
Container of alcohol
Paper cups
Sugar
Salt
Flour
Oil
Starch

Evaluation:

The student will define the words accompanying the experiments.

LAB SHEET FOR SOLUTIONS

Solutions are made by dissolving one substance in another substance called a solvent. Water is a solvent that dissolves many substances that your body needs. Alcohol is a common solvent used by chemists. Materials that dissolve in water or alcohol are called solutes. Soluble substances will dissolve in a solvent and insoluble substances will not dissolve in a solvent.

Definitions:

Solvent - Liquid such as water or alcohol that dissolves a substance
Solute - The substance that dissolves in water or alcohol
Solution - The mixture of a solvent and a solute
Soluble - If a substance dissolves in a solvent, it is soluble.
Insoluble - If a substance does not dissolve in a solvent, it is insoluble.

Objective:

Determine whether the following common materials are soluble or insoluble in water and/or alcohol:

sugar	salt
flour	oil
starch	

Procedure:

A.
1. Place about a tablespoon of water (H_2O) in a paper cup.
2. Add about 10 grains of sugar.
3. Stir and notice how the sugar dissolves in the water.
4. Write "soluble" in the data table, first column, opposite sugar.
5. Empty the cup into the bucket.

Note: When testing other solids, use a similarly small amount of the material you are testing in a tablespoon or two of water.
When testing liquids, use two drops of the liquid in a tablespoon or two of water.

B.
1. Place about a tablespoon of alcohol in a paper cup.
2. Add about 10 grains of sugar.
3. Stir and notice if the sugar dissolves in the alcohol.
4. Write "soluble" or "insoluble," whichever applies in the second column of the data table opposite sugar.
5. Empty the cup into the bucket.

Observations:

Record the results of your experiments in the data table below. If the material dissolves, write soluble under "Solubility in Water" or "Solubility in Alcohol." If it does not dissolve, write insoluble in the proper space.

Substance Tested	Solubility in Water	Solubility in Alcohol
Sugar		
Flour		
Salt		
Oil		
Starch		

Conclusions:

HOJA DE LABORATORIA PARA SOLUCIONES

Agua es un solvente que disuelve las sustancias necesitadas para el cuerpo. Alcohol es un solvente usado por los químicos. Las materias que se disuelven en agua y alcohol son solubles.

Definiciones:

Solvente	-	Un líquido que disuelve otra sustancia
Soluto	-	La sustancia que disuelve otro solvente
Solución	-	Mezcla de solvente y soluto
Soluble	-	Material que se disuelve en agua o alcohol
Insoluble	-	Material que no se disuelve en agua o alcohol

Objetivo:

En esta investigación determinen si los siguientes materiales son soluble o insoluble.

azúcar	aceite
harina	almidón
sal	

Procedimiento:

A. 1. Ponga una cucharita de agua (H_2O) en una taza de papel.
   2. Agregue un poco de azúcar.
   3. Revuélvalo y note que el azúcar se disuelve en el agua.
   4. Escriba "soluble" en la escala abajo donde se encuentra la palabra azúcar.
   5. Cuando examine los demás sólidos, favor de poner muy poco de la materia en una cucharita de agua.
   6. Cuando está examinando los líquidos, use una cantidad poquita en una cucharita de agua.

B. Repita los procedimientos usado arriba, pero esta vez use alcohol.

Observaciones:

Apunte el resultado de los experimentos sobre la solubilidad en el cuadro diseñado abajo.

Si la materia se puede disolver, escriba soluble debajo de "Soluble en Agua" o "Soluble en Alcohol." Si no se puede disolver, excriba insoluble en el espacio que concuerde con la materia usada.

DATA TABLE

Sustancia	Soluble en Agua	Soluble en Alcohol
Azucar		
Harina		
Sal		
Aceite		
Almidón		

Conclusión:

THE MICROSCOPE

Level:

Grades 7 - 12

Objectives:

1. The student will be able to label the parts of the microscope.

2. The student will be able to focus the microscope on a prepared slide.

Level of Communication:

Individual, group

Procedure:

1. The teacher should hand the student the drawing of the microscope along with the explanation sheet (either in Spanish or in English).

2. The teacher should provide the student with a microscope so that he can locate the parts and follow the procedure on its use.

3. If the student knows English or the teacher is bilingual, the use of the microscope can be demonstrated orally.

Materials:

Explanation sheet (Spanish or English)
Drawing of the microscope (Spanish or English)
Microscope
Prepared slide

Evaluation:

Have the student point to the parts of the microscope and name them. The Spanish speaking student should say the names of the microscope parts in both Spanish and English. As the student names the parts, he should also be able to demonstrate the use.

STUDY OF THE MICROSCOPE

I. The Parts

a. BASE - The microscope is mounted on a base.

b. EYEPIECE - The eyepiece (ocular lens) is used for viewing.

c. TUBE - The tube contains the eyepiece at the top and the objective lens or lenses at the bottom.

d. OPTIC SYSTEM - The optic system is composed of the EYEPIECE and the OBJECTIVE LENSES. Some microscopes have one objective lens, others have two, three, or four, ranging from small magnification to larger magnification.

e. FINE ADJUSTMENT (low power) and COARSE ADJUSTMENT (high power) KNOBS are used to focus the microscope.

f. STAGE CLIPS - Two flexible clips hold the specimen on the STAGE.

g. MIRROR - The mirror, below the stage, reflects the light across the opening. (The microscope may have a light to furnish illumination.)

II. The Use

a. The microscope should be placed on the table with the support toward the observer.

b. Place prepared slide under the flexible clips with the specimen over the opening in the stage.

c. Place the lowest power objective lens in the viewing position.

d. Looking from the side of the microscope, lower the tube slowly, using the coarse adjustment knob, until the objective lens almost touches the prepared slide.

e. Observing through the eyepiece, focus by turning the coarse adjustment knob to raise the tube and by turning the fine adjustment knob until the specimen appears perfectly clear.

ESTUDIO DEL MICROSCOPIO

I. Las Partes

a. BASE - El microscopio está montado sobre una base.

b. EYEPIECE - Lente ocular es la parte que se usa para observar.

c. TUBE - El tubo contiene el lente ocular y los lentes del objetivo.

d. OPTIC SYSTEM - Los lentes del objetivo son una parte del sistema óptico; la otra parte es el lente ocular. Algunos microscopios sólo tienen un objetivo; otros tienen dos (uno de pequeño aumento y otro de gran aumento); otros, finalmente, pueden tener un tercer objetivo que es él de mayor aumento.

e. FINE ADJUSTMENT and COARSE ADJUSTMENT - Los dos reguladores (tornillos), el macrometrico y el micrométrico, se usan para enfocar el microscopio.

f. STAGE CLIPS - Dos pinzas flexibles se sostienen en la platina.

g. MIRROR - El espejo, bajo la platina, se usa para reflejar la luz a través del orificio.

II. Uso del microscopio

a. Coloque el microscopio sobre una mesa, con el soporte hacia el observador.

b. Ponga la platina abajo de las pinzas flexibles, colocando la muestra sobre la abertura.

c. Coloque el objetivo de pequeño aumento en una posición que coincida con la abertura de la platina.

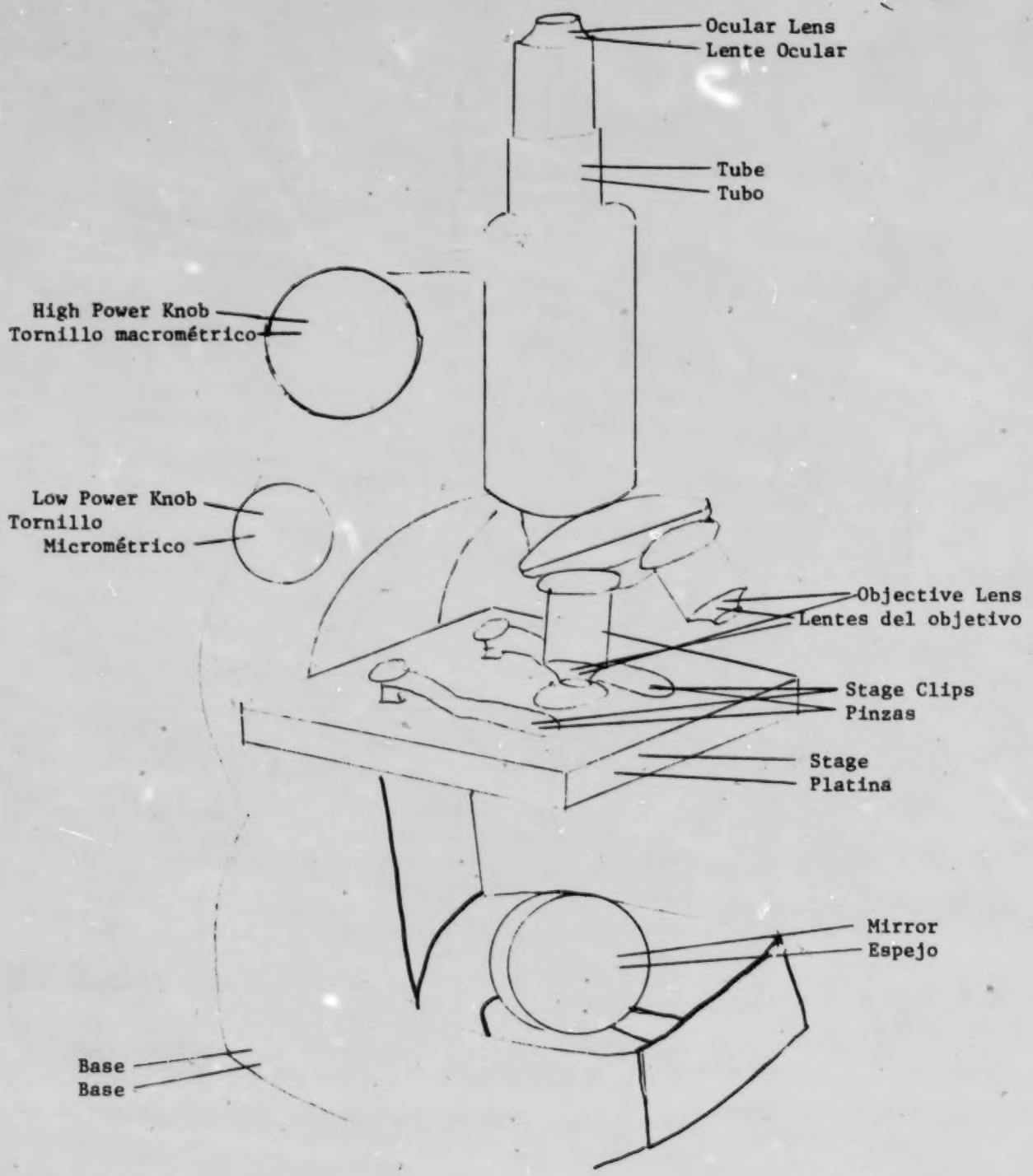
d. Observando los objetivos lateralmente, bájelos lentamente usando el tornillo macrométrico, hasta que casi toque la platina.

e. Observando por el lente, enfoquelo, haciendo girar el tornillo macrométrico en el sentido que eleva el objetivo hasta que la muestra aparezca perfectamente clara.

Reference: Brandwein, Paul D., *Biología: La Vida.*

PARTS OF THE MICROSCOPE

PARTES DEL MICROSCOPIO



17

THE CELL

Level:

Grades 7 - 12

Objectives:

1. The student will be able to distinguish between a plant and an animal cell and explain the difference in structure.

2. The student will be able to correctly name and label the parts of a cell.

Level of Communication:

Individual, group

Procedure:

1. Give the student the following information:

   . All living things are made up of one or more cells.

   . Some plants and animals contain only one cell each.

   . Some plants and animals contain millions of cells each.

   . Plants and animals contain many different kinds of cells.

   . Cells have different shapes and sizes because they have different jobs to do.

   . Animal and plant cells have certain similarities, such as nucleus, cytoplasm, and an outer covering.

   . Animal and plant cells have certain differences; for example, animal cells have membranes while plant cells have walls. Green plant cells contain chlorophyll, with which they manufacture their own food; animal cells contain no chlorophyll.

2. Show the transparencies of the plant and animal cells to help explain the above information. Explain the functions of each part of the plant and animal cells and elicit oral repetition of the concepts as the visuals are presented.

3. While showing the transparencies, have the student draw and label the parts of cells as they are presented on the transparencies.

4. Give the student a list of definitions and have him work the cross-word puzzle.

Materials:

List of definitions
Transparencies of the plant and animal cells
Crossword puzzle

Variations:

1. Have the student make a clay model of a cell with each part labeled and colored a different color.

2. Have the student make a poster to compare plant and animal cells.

3. Have the student make a cell model by enclosing gelatin in a plastic bag, with beans and marbles inserted as the gelatin hardens to represent subcellular particles.

Evaluation:

Have the student draw and label a plant cell and an animal cell and tell the function of each part of each kind of cell.

THE STUDY OF THE CELL

Definitions

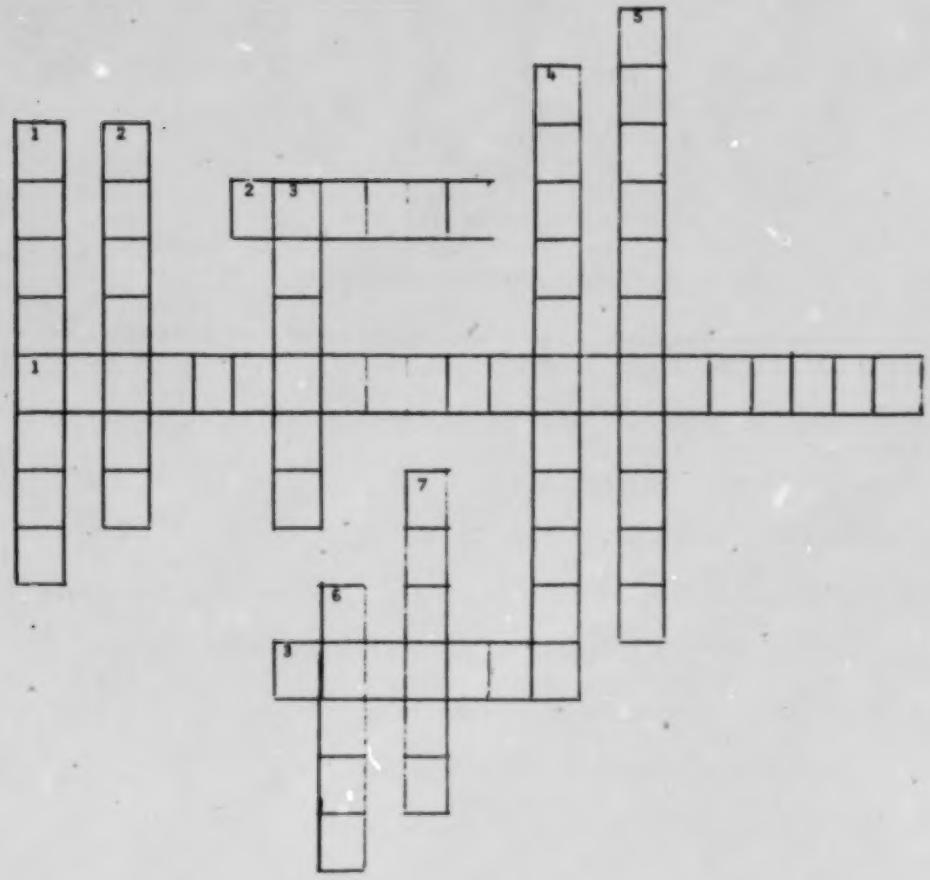
1. CELL - Basic unit of structure in all living things
2. ANIMAL CELL - Membrane enclosed cell which contains all necessary structures to enable an animal to continue life
3. PLANT CELL - Cell different from an animal cell in that it is enclosed in a cell wall and contains chloroplasts
4. VACUOLE - Empty space in cell which may contain elimination wastes or water
5. CHLOROPLAST - Contains the chlorophyll which produces the green in a plant and helps a plant manufacture its food
6. MITOCHONDRION - Oblong structure which is the energy center of a cell
7. ENDOPLASMIC RETICULUM - The canals within a cell which lead from the nucleus to the outer wall or membrane
8. NUCLEUS - Main control structure within a cell
9. MEMBRANE - Outer covering of the animal cell
10. WALL - Outer covering of the plant cell
11. CYTOPLASM - That material within a cell that holds the structures in place

ESTUDIO LA CÉLULA

Definiciones

1. CÉLULA - Básica unidad estructural de la vida
2. CÉLULA DE ANIMALES - no tienen paredes celulares
3. CÉLULA VEGETALES - son las células de las plantas que tienen paredes y cloroplastos con clorofila
4. VACUOLA - Vaso que contiene agua alimento, o material de desperdicio
5. CLOROPLASTO - Contienen clorofila
6. MITOCONDRIA - El centro de energía de la célula
7. RETÍCULO ENDOPLÁSMICO - Red de canales del citoplasma en la célula
8. NÚCLEO - Estructura que controla el metabolismo de una célula
9. MEMBRANA CELULAR - limita la célula de animales
10. PARED DE LA CÉLULA - limita la célula de plantas
11. CITOPLASMA - Material dentro de la célula que contiene todas las estructuras

ESTUDIO DE LA CÉLULA



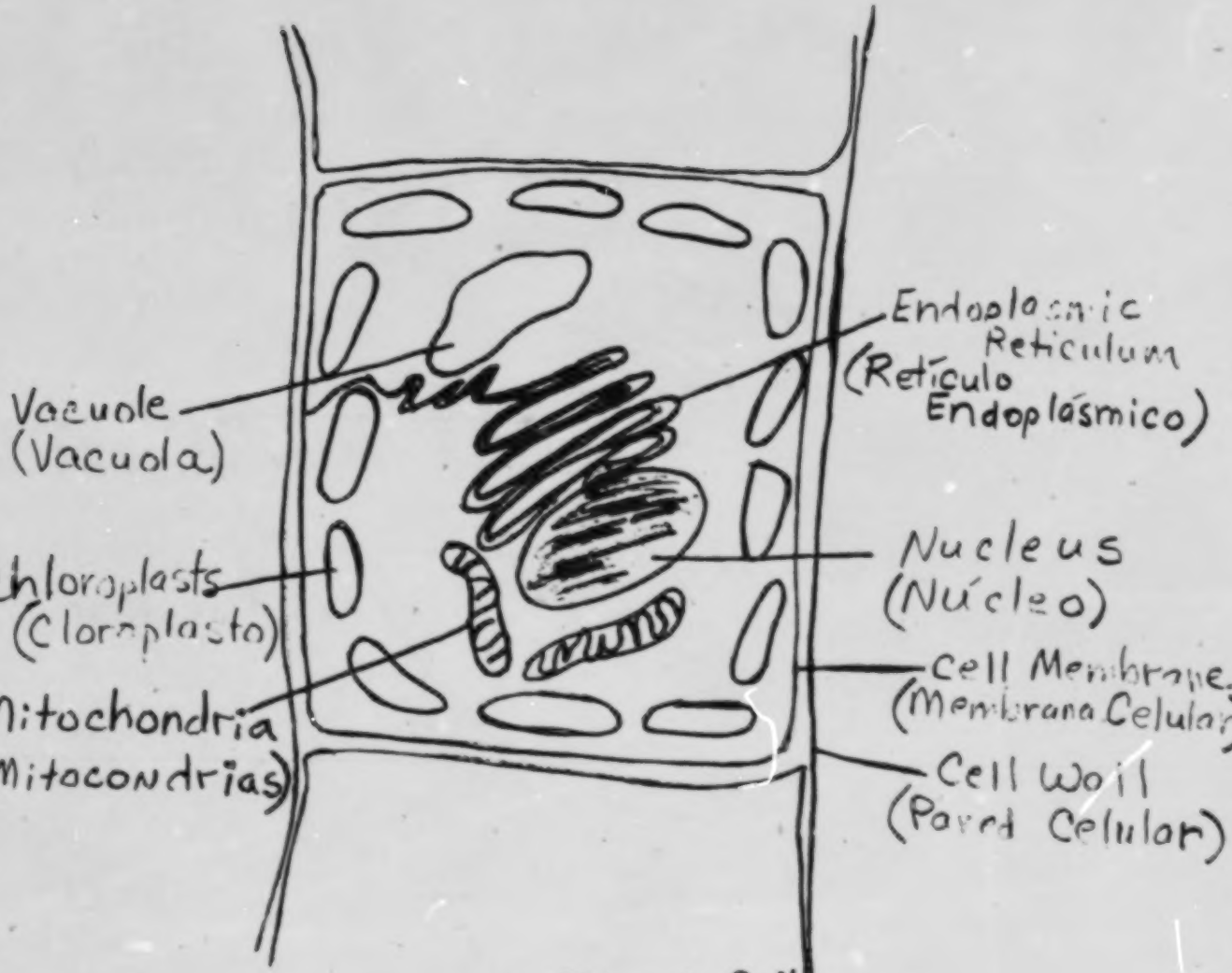
Vertical

1. Limita a la célula de animales
2. Célula que tiene paredes
3. Estructura que controla el metabolismo de una célula
4. La central de energía de la célula
5. Contienen clorofila
6. Limita la célula de plantas
7. Básica unidad estructural de la vida

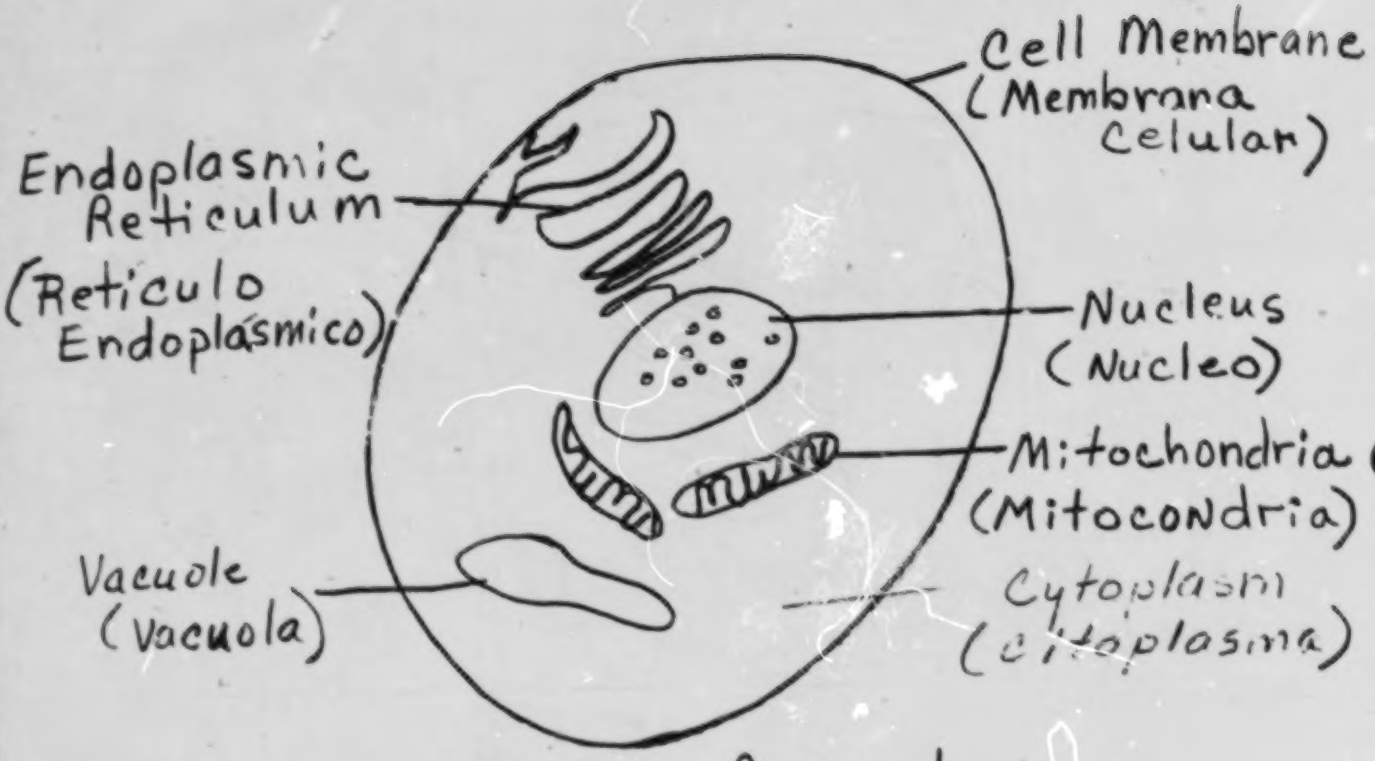
Horizontal

1. Red de canales del citoplasma
2. Célula que no tiene paredes
3. Vaso que contiene agua o material de desperdicio

52



Typical Plant Cell
(Una Célula Vegetal Típica)



Typical Animal Cell

(Una Célula Animal Típica)

MITOSIS - CELL DIVISION

Level:

Grades 7 - 12

Objective:

The student will be able to list the steps in cell division (mitosis) and explain the processes involved.

Level of Communication:

Individual, group

Procedure:

1. Student will be provided with the worksheet on mitosis. Transparencies or professional drawings showing the stages of mitosis can be viewed from a book.

2. Student will view microscope slides to identify the various stages of mitosis.

3. Student will write short reports about the cell during mitosis. (Some of these can be made into transparencies to be read as a group activity.)

Materials:

Worksheet on mitosis
Drawings of the stages of mitosis
Microscope
Microscope slides of animal and plant mitosis
Word's transparencies with the accompanying worksheet on animal mitosis and plant mitosis
Transparencies from the American Cancer Society, "The Cell Mitosis in Animal Cells"

Evaluation:

The student will recite the stages of mitosis orally and be able to draw the different stages without any assistance.

MITOSIS - CELL DIVISION

A cell may divide to form two cells. This process is called mitosis. This is how body cells increase in number. Cells may grow old and die. Mitosis replaces cells that die or are worn away. Mitosis is a continuous process in which cellular material passes through four stages:

1. Prophase

Chromosomes in the nucleus

   a. Chromosomes are formed in the nucleus of the cell. (Chromosomes are rod-like structures that carry the genes.
   b. One chromosome has duplicated itself. It is two chromosomes now.

2. Metaphase

   a. The identical chromosomes line up in the center and split.
   b. The spindle is formed at the center across the identical chromosomes to both ends of the cell.

3. Anaphase

   a. The split chromosomes are separated and drawn apart toward the centrioles, which are tiny spheres outside two ends of the nucleus.
   b. The chromosomes move in opposite directions and are identical sets.

4. Telophase

   a. Spindle fibers disappear
   b. Two nuclei are formed
   c. A cell plate forms between the two nuclei
   d. The two cells finally separate into two identical cells

MITOSIS - DIVISIÓN CELULAR

Cuando una célula se divide, se multiplica. Varios científicos han observado los cambios estructurales efectuados en el núcleo de las células, durante el proceso de su división. Han sido numerosos los términos adoptados para describir las estructuras que aparecen durante la división célular. Debido a cierta sustancia nuclear que interviene en la división, tiñe brillantemente las células que no están en este proceso. Se le ha llamado cromatina que significa "materia coloreada." En las primeras etapas, la cromatina aparece como unos hilos largos; después, gradualmente se acortan, engrosan y se dividen en estructuras separadas. Esas estructuras se llaman cromosomas, que quiere decir cuerpos coloreados. El proceso completo de la división celular se llama mitosis.

Las cuatro etapas durante el proceso de mitosos son: (En orden)

1. Profase

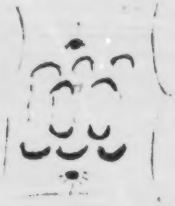
Cromosomas en el núcleo

   a. Los cromosomas aparecen como finas varillas.
   b. Los cromosomas llegan a ser ligeramente espirales.

2. Metafase

   a. Los cromosomas se dividen longitudinalmente.
   b. Los cromosomas se alinean en el centro de la célula.
   c. Los cromosomas se separan.

3. Anafase



   a. Formación de los núcleos hijos
   b. En este momento, el encogimiento hace frecuentes estrías que aparecen en algún lado de la célula.

4. Telofase

   a. Se forman dos células
   b. Retorno al punto de partida

Reference: Smallwood, William L., Edna Green. *Biología.*

GENETICS

Level:

Grades 7 - 12

Objectives:

1. Student will be able to define vocabulary words (in English and/or Spanish).

2. Student will be able to determine dominant and recessive traits by working through the Dominance Game.

3. Student will be able to solve genetics problems in the Punnett Square.

Level of Communication:

Individual, group

Procedure:

1. Student will use the handout (in English and/or Spanish) to study the vocabulary. (See "Words to Know.")

2. Student will participate in oral drills to master the pronunciation of important terms.

3. Student will participate orally in the Dominance Game.

4. Student will work individually or in a small group on the genetics problems. (See "Determining Outcomes.")

The teacher will repeat the demonstration of this process until most of the students have mastered it.

Materials:

Handouts of definitions
Squares of plastic (clear and green) to represent gene traits.

Evaluation:

Students will work problems on the Punnett Squares.

GENETICS

WORDS TO KNOW

1. GENETICS - The study of heredity
2. GENES - Units in a chromosome which determine a trait or characteristic
3. DOMINANT TRAIT - One which shows up even when only a single dominant gene is present
4. RECESSIVE TRAIT - One which does not show up if one dominant gene is present
5. OFFSPRING - The individual born of two parents

PALABRAS IMPORTANTES

1. GENÉTICA - Estudio de la herencia
2. GENES - Unidades en los cromosomas que determinan el rasgo o característica
3. RASGO o CARÁCTER DOMINANTE - Él que aparece aunque solamente hay presente un gene dominante
4. RASGO o CARÁCTER RECESIVO - Él que no aparece si el gene que lo acompaña es dominante
5. DESCENDIENTES - los individuos nacidos de dos padres

GENETICS - THE DOMINANCE GAME

Materials:

Clear plastic squares = (g)

Green plastic squares = (G)

The squares of plastic represent gene traits by color.

Step 1
a. Hold up a (G) square. What color do you see? _____
b. Hold up a (g) square. What color do you see? _____

Step 2
a. Hold a (G) square over another (G) square. This is the gene pair (GG). What color shows up? _____
b. Hold a (g) square over another (g) square. This is the gene pair (gg). What color shows up? _____
c. Hold a (G) square over a (g) square. This is the gene pair (Gg). What color shows up? _____

Step 3
a. Which color is dominant over the other? _____

b. Which is the recessive color? _____

c. What are the colors for the following gene pairs?

GG _____ _____

Gg _____ _____

gg _____ _____

gG _____ _____

Step 4 Using the letter B = Brown eyes and letter b = blue eyes,

a. Write which is a dominant or recessive trait.

Brown (B) is a _____ trait.
Blue (b) is a _____ trait.

b. Write which trait, dominant or recessive, is shown.

The father is (BB) and shows a _____ trait.
The mother is (bb) and shows a _____ trait.
If the father is Bb, it shows a _____ trait.

c. Name the eye color below:

The color of (BB) is _____
The color of (bb) is _____
The color of Bb is _____
The color of bB is _____

Determining Outcomes

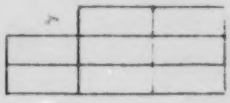
B = Brown eyes b = Blue eyes

♂ Father is (BB) ♀ Mother is (bb)

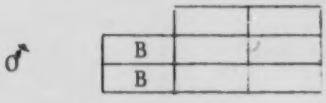
What are the possible outcomes for the offspring?

Procedure:

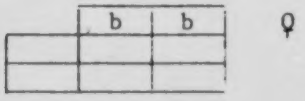
a. Make a square called Punnet Square.



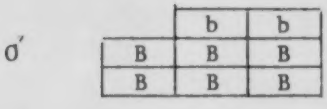
b. Separate the father's genes and place in the two left hand blocks.



c. Separate the mother's genes and place in the top two blocks.



d. Bring the male genes across to the right into each block.



e. Bring the female genes down into each block and place them next to the male genes.

	b	b
B	Bb	Bb
B	Bb	Bb

f. Since all the gene types will be Bb, the offspring will all have brown eyes. B (brown) is dominant, b (blue) is recessive.

DOMINANCE WORKSHEET

Work the following problems using the Punnett Square:

1. B = Brown eyes b = Blue eyes

   a. Male ♂ = BB Female ♀ = Bb

   What are the possible outcomes for the offspring?

♂ \ ♀	B	b
B	BB	Bb
B	BB	Bb

   All the offspring will have brown eyes.

   b. Male ♂ = Bb Female ♀ = Bb

   What are the possible outcomes for the offspring?

♂ \ ♀	B	b
B	BB	Bb
b	Bb	bb

   Three of the offspring will have brown eyes, one will have blue.

2. RR = Red hair rr = blond hair

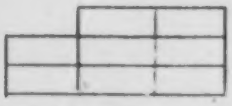
   Male = Rr Female = RR

3. GG = Green eyes gg = blue eyes

   Male = GG Female = gg

4. TT = Tall tt = Short

Male = Tt Female = Tt



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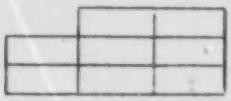
5. RR = Red flower rr = White flower

Male = rr Female = Rr



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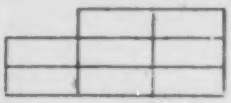
6. PP = Purple flower pp = White flower

Male = PP Female = pP



GENÉTICA

Materiales:

Cuadros claros = (g) Cuadros verdes = (G)

Carácteres dominantes - Se usan las letras mayúsculas del alfabeto

Carácteres recesivos - Se usan las letras minúsculas del alfabeto

Los cuadros plásticos representan facciones genéticas.

Paso 1
a. Levante cuadro (G). Maestro: ¿Qué color ve Ud.? _____
b. Levante cuadro (g). Maestro: ¿Qué color ve Ud.? _____

Paso 2
a. Detenga cuadro (G) sobre otro cuadro (G). Este es el par genético (GG). ¿Qué color resalta? _____
b. Detenga cuadro (g) sobre otro cuadro (g). Este es el par genético (gg). ¿Qué color resalta? _____
c. Detenga cuadro (G) sobre cuadro (g). Este es el par genético (Gg). ¿Qué color ve Ud.? _____

Paso 3.
a. ¿Qué color domina sobre el otro? _____
b. ¿Qué color es recesivo? _____
c. ¿Cuáles son los colores para los siguientes pares de genes?

GG _____ _____
Gg _____ _____
gg _____ _____
gG _____ _____

Paso 4 Usando las letras B = ojos color café and letter b = blue eyes,

a. Escriba que facción (rasgo) es recesivo o dominante.

Café es rasgo _____
Azul es rasgo _____

b. Indique si las siguientes son dominantes o recesivos.

El padre es (BB) y enseña facciones _____.
La madre es (bb) y enseña facciones _____.
Si el padre es (Bb), enseña facciones _____.

c. Indique el color de los ojos:

El color de (BB) es _____
El color de (bb) es _____
El color de (Bb) es _____
El color de (bB) es _____

Determinar Resultados

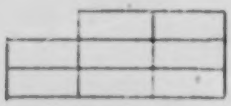
B = ojos color café b = ojos color azul

Padre es (BB) Madre es (bb)

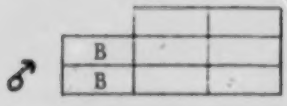
¿Cuáles son las facciones posibles de la descendencia?

Procedimiento:

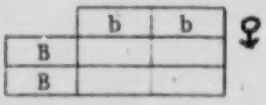
a. Haga un cuadro Punnett.



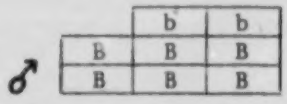
b. Separe los genes del padre y póngalos al lado del cuadro.



c. Separe los genes de la madre y póngalos arriba del cuadro.



d. Ponga los genes masculinos a la derecha de cada cadrito.



e. Ponga los genes femeninos en cada cuadrito por abajo y en seguida de los genes masculinos.

	b	b
B	Bb	Bb
B	Bb	Bb

f. ¿Cuáles son las posibilidades de la descendencia?

Respuesta: Todos los tipos de genes serán (Bb). La descendencia tendrá ojos color café. B (café) es dominante, b (azul) es recesivo.

EJERCICIO - DOMINANCIA

Resuelvan los siguientes problemas usando el cuadro Punnett:

1. B = ojos color café b = ojos color azul

   a. Masculino ♂ = BB Femenino ♀ = Bb

   Indique cual es la posibilidad de la descendencia.

♂	B	b
B	BB	Bb
B	BB	Bb

♀

Todos los descendientes tendrán ojos color café.

   b. Masculino ♂ = Bb Femenino ♀ = Bb

♂	B	b
B	BB	Bb
b	bB	bb

♀

3 de 4 tendrán ojos color café; 1 de 4 tendrá ojos color azul.

2. RR = cabello rojo rr = cabello rubio

   Masculino = Rr Femenino = RR

---

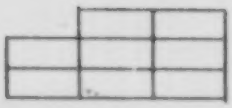
3. GG = ojos verdes gg = ojos azules

   Masculino = GG Femenino = gg

---

4. TT = alto tt = bajo (chaparro)

Masculino = Tt Femenino = Tt



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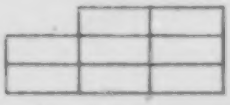
5. RR = flor roja rr = flor blanca

Masculino = rr Femenino = Rr



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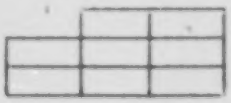
6. PP = flor morada pp = flor blanca

Masculino = PP Femenino = pP



CLASSIFICATION

Level:

Grades 7 - 12

Objectives:

The student will be able to:

1. Classify a given set of objects, living or non-living, through observations.

2. Classify living things by observing similar characteristics among them.

Level of Communication:

Individual, group

Procedure:

1. The student will make a list of the different ways in which living things can be classified.

2. Show slides as illustrated within and ask the student to list the physical traits of each animal. Then have the student look at the list and determine which animals may be grouped together.

3. Give the student Exercise 1 on classification; then Exercise 2 on classification.

4. Exercise 3 "Is There Order to Chaos?" may be done individually.

   a. The teacher should have 15 forms cut from different colors of construction paper. The teacher should use shapes with rounded edges and squared edges, with and without notches, which will be the basis for the classification.

   b. Playing cards may be grouped by color, suit, or number.

   c. Animals may be grouped:

      all animals with feathers vs without
      all animals with wings vs without
      all animals with hair vs without, with or without scales, horns, wings, human heads, hoofs, etc.

5. Exercise 4 reinforces the lesson on how to classify these animals. The student may color these to help classify by color and physical characteristics. The student may refer to Exercise 1 to name kingdom, phylum, and class of each animal.

Materials:

Exercise 1, Classification (both Spanish and English)
Exercise 2, Classification (both Spanish and English)
Exercise 3, Is There Order to Chaos?
Exercise 4, Sheet of animal pictures
Slides of pictures of animals
Colored construction paper cut-outs
Deck of playing cards

Evaluation:

Exercise 4 may be used for evaluation purposes:

1. Color the animals.
2. Make a list of those animals with similar characteristics.
3. Refer to Exercise 1 for help in placing the animals in their own kingdom, phylum, and class.

CLASSIFICATION

Exercise 1

Biologists study the "characteristics" or traits, of organisms. Name these organisms and separate them into different groups. Grouping of organisms is based on similarities, differences, and relationships. "Classification" of living things is the scientific study of various kinds of organisms, their differences, and their relationships. By classifying things into groups, it becomes easier to know and understand their characteristics.

Answer these questions:

1. **What is the grouping of organisms based on?**
2. **What are "charcteristics" of living things?**
3. **What is "classification"?**

Today's system of classification divides living things into three main groups called kingdoms.

1. Plant kingdom
2. Animal kingdom
3. Protist kingdom

Then each kingdom is divided into phyla; each phylum into classes; each class into orders; each order into families; each family into genuses; and each genus into species. In some cases, these divisions are broken into sub- and super-divisions; such as sub-class or super-order.

Partial classification of some organisms:

Kingdom:	PLANTS	ANIMALS	PROTISTS
Phylum:	Tracheophyta	Porifera (sponges)	(One celled organisms that have the characteristics of plants and animals - usually both.)
	Bryophyta	Mollusca (hard-shelled, soft-bodied)	
		# Arthropoda	
		+ Chordata (back-boned)	
Class:	# ARTHROPODA Insecta (75% of all known animals)	+ CHORDATA Fishes Amphibia Reptilia Aves (birds) Mammalia (warm-blooded)	

Answer these questions about the chart above:

1. What are the three kingdoms of living things?
2. What are the two phylums in the plant kingdom?
3. What is the protist kingdom?
4. What does chordata mean?
5. What are some phyla in the animal kingdom?

CLASSIFICATION

Exercise 2

If you were asked to classify objects, your plan for classifying would be a system of grouping together those objects which have some certain things in common. A scientist does the same thing when he groups or classifies living things. He places those living things into groups because of certain likenesses or similar characteristics. Each group may then be divided into subgroups and possibly even into sub-subgroups. He also uses names for each of his groups and subgroups to help simplify his work.

1. Cut out all 13 objects shown on attached sheet. By following instructions, students will be able to classify these objects into kingdoms, phyla and classes.

2. Kingdoms:

   a. Classify your objects into two kingdoms. Place objects 3, 4, 6, 7, 9, 10, and 11 into one group. This will represent one kingdom.

   b. Place objects 1, 2, 5, 8, 12, and 13 into a second group, or second kingdom. What characteristics do all members of the first group have that make them different from the second group?

      _____

      _____

      If you had to use a name that describes the characteristic that is common to the first kingdom, what would be a suitable name?

      _____

      What name describes the second kingdom when compared to the first?

      _____

3. Phyla:

   a. Use objects in your first kingdom only and separate them into groups. Place objects 3, 4, 7, and 10 into one group. This will be one phylum.

   b. Place objects 6 and 9 into another group. This is a second phylum.

c. Place 11 by itself for a third phylum. What characteristic do objects 3, 4, 7, and 10 have that make them different from 6 and 9 or 11?

_____

Why are 6 and 9 different from 11?

_____

If you had to use a name that describes the characteristic that is common to the first phylum with 3, 4, 7, and 10, what would be a suitable name?_____

What name would best describe the second phylum?_____
The third phylum?_____

4. Classes:

a. Use objects 3, 4, 7, and 10 only and separate them into groups. Place 10 into a second group, or second class. What characteristic do objects 3, 4, and 7 have that makes them different from 10?

_____

_____

b. What name would best describe the class for objects 3, 4, and 7?

_____

For object 10?_____

EXTRA ACTIVITIES:

1. Prepare a classification system that will divide objects 1, 2, 5, 8, 12, and 13 into two phyla. List the number of the objects in your first phylum_____

Your second phylum_____

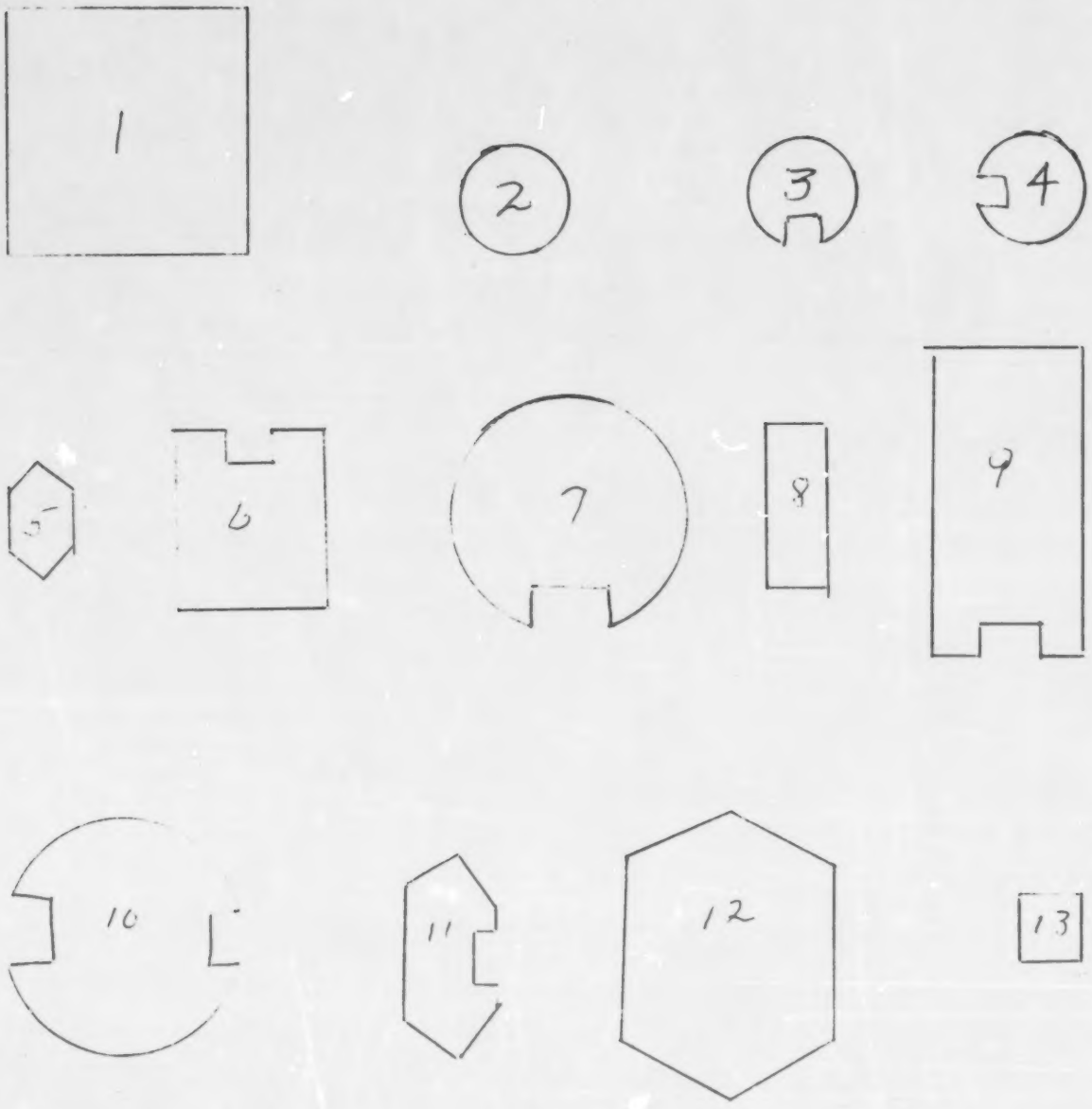
2. What characteristic was used to separate these six figures into two phyla?

_____

3. What did you use to decide if the paper objects are to be grouped in the same or different kingdoms?

_____

EXERCISE 2



CLASIFICACIÔN

Ejercicio 1

Este ensayo está basado en la división de los organismos en tres reinos: las protistas, las plantas, y los animales. Todos los biólogos aceptan un sistema de clasificación. Los reinos están divididos en phyla. Todos los phylas no están representados aquí. Sin embargo, con el sistema abreviado de clasificación será posible apreciar la gran diversidad de formas vivientes que hay en la biósfera. La agrupación de organismos está basada en semejanzas, diferencias, y relaciones. Después de la phyla se dividen en clases y órdenes, y familias.

Algunos organismos clasificados:

Reinos:	PLANTAS	ANIMALES	PROTISTAS
Phyla:	Tracheophyta	Porifera (esponjas)	(Organismos unicelulares que tienen características de plantas y animales)
	Bryophyta	Mollusca (conchas, cuerpo, blando)	
		# Arthropoda	
		+ Chordata (cordados)	

	# de ARTHROPODA	+ de CHORDATA
Clase:	Insecta (75% de todos los animales conocidos)	Peces Amphibia Reptilia Aves (pájaros) Mammalia (de sangre caliente)

Reference: Smallwood and Green, *Biología*.

CLASIFICACION

Ejercicio 2

En plan de clasificación se basa bajo un sistema donde se agrupan aquellos objetos que tienen algo similar. El científico hace lo mismo para clasificar o agrupar todos organismos. Se agrupan todos organismos que tienen algo similar. Cada grupo entonces se puede dividir entre otros grupos. Cada grupo tiene su nombre.

1. Corte los 13 objetos. Fijándose en las instrucciones siquientes, ustedes podrán clasificar los objetos de acuerdo con su reino, phyla, y clases:

2. Reinos:

   a. Clasifique objetos entre dos reinos. Ponga objetos 3, 4, 6, 7, 9, 10 y 11 en un grupo. Ésto representará un reino.

   b. Ponga objetos 1, 2, 5, 8, 12, y 13 en un segundo grupo o segundo reino. ¿Cuáles son las características de los miembros del primer grupo que los hacen diferentes al segundo?

   _____

   _____

   ¿Si tuvieran qué usar un nombre que describiera las características del primer grupo, qué nombre usaría?

   _____

   ¿Qué nombre describe el segundo reino en comparación al primero?

   _____

3. Phylas:

   a. Use los objetos en el primer reino y sepárelos en grupos. Ponga objetos 3, 4, 7, y 10 en un grupo. Ésto será un phyla.

   b. Ponga objetos 6 y 9 en otro grupo. Ésta será un phyla segundo.

   c. Ponga objetos número 11 en un tercer phyla. ¿Cuáles son las características distintas entre objetos 3, 4, 7, 10 y 6, 9, 11?

_____

¿Por qué son 6 y 9 diferentes al 11? _____

¿Qué nombre describe las características comunes en el primer phyla con 3, 4, 7, y 10?

¿Qué nombre describe el tercer phyla?

4. Clases:

a. Separe en grupos los numeros 3, 4, 7, y 10. Ponga 3, 4, y 7 en un grupo. Esta será una clase. Ponga el número 10 en un segundo grupo o clase.

¿Cuáles son las características entre 3, 4, y 7 que no se encuentran en 10?

¿Qué nombre describe la clase para 3, 4, y 7?

¿Qué nombre describe la clase para 10?

Exercise 3

You have learned that living things are grouped or classified into different categories based on similarities and differences between them. Try to group these other materials into similar categories.

a. Given an assortment of colored cutouts, you can see that all are different. Yet they are similar in certain ways. How?

Is there any order in the collection? Try arranging them in groups on your table. After you finish, mix them up and regroup them all in another way. Every time you regroup the cutouts, each of the cutouts has to be in one group or another.

Separation of cutouts into related groups

Can be grouped according to	Kinds of cutouts in each group

b. Now try grouping with a deck of playing cards. As you know, all 52 cards are different. Yet they are similar in certain ways. How many different ways are 52 cards similar? How many different ways can you sort and group 52 cards?

Separation of cards into related groups

Can be grouped according to	Kinds of cards in each group

c. You will be given a collection of animal pictures. Sort these into stacks. All the animals in a stack must be related, and each stack must be related to the other stacks. Be specific. Remember, these are imaginary animals.

Separation of animals into related groups

Can be grouped according to	Characteristics in each group

Exercise 3 Animal Pictures

1.

2.

3.

4.

5.

6.

7.

8.

Exercise 4

Red Crossbill

Hog-nosed Snake

Lady bird Beetle

Bald Eagle

Runner
Lizard

Gibbon

COMMON
HOUSE
FLY

Panda
Bear

Seal

Fish

Fish

RECORD BREAKERS AMONG ANIMALS

Level:

Grades 7 - 12

Objectives:

1. The student will learn the names of the animals on the transparency.*
2. The student will be able to relate unique facts about certain animals, such as smallest, largest, etc.

Level of Communication:

Individual, group

Procedure:

1. The teacher will show the transparency of animals as the pre-test is given orally on record breakers. The student will answer with the number of the animal that the teacher is asking about. Multiple choice may be used if the test is written.
2. The teacher will use the ESL lesson as described in the attached activity by using the answers to record breakers.
3. The attached "Know a Name Game" may be used for repetition drill.

Materials:

Pre-test (Question and Answer Sheets)
Oral Reinforcement Drills
Know A Name Game

Evaluation:

Evaluation may be based on the use of any of the above materials.

Note: The teacher will make a transparency from the drawings at end of this unit.

PRE-TEST (QUESTIONS)

1. What is the largest animal that has ever lived?
2. What animal lives the longest?
3. What animal runs the fastest?
4. What is the fastest flying bird?
5. What is the largest fish?
6. What is the longest snake?
7. What is the smallest animal?
8. What is the smallest backboned animal?
9. Which mammal is the smallest at birth?
10. What is the smallest living mammal?
11. What is the largest amphibian?
12. What animal has the sharpest eyes?
13. What animal has the longest horns?

Answers -

1. The largest animal that has ever lived is a whale.
2. The animal that lives the longest is a tortoise.
3. The animal that runs the fastest is the cheetah.
4. The fastest flying bird is the Indian Swift.
5. The largest fish is the whale shark.
6. The longest snake is the anaconda.
7. The smallest animal is the protozoa.
8. The smallest backboned animal is the goby fish.
9. The mammal which is the smallest at birth is the opossum.
10. The smallest living mammal is the mouse.
11. The largest amphibian is the Japanese salamander.
12. The animal which has the sharpest eyes is the bird
13. The animal which has the longest horns is the buffalo.

PATTERN FOR TRANSPARENCY

ORAL REINFORCEMENT DRILLS

Repetition:

Teacher: The whale is the largest animal that has ever lived.

Students: (Listen only)

Teacher: the largest animal

Students: the largest animal

Teacher: The whale is the largest animal.

Students: The whale is the largest animal.

(Each definition can be practiced and related to the pictures in this manner.)

Transformation:

Teacher: Is the whale the largest animal?

Students: (Repeat)

Teacher: Yes, the whale is the largest animal.

Students: (Repeat)

Teacher: Is the deer the largest animal?

Students: No, the deer is not the largest animal.

Rapid Response:

Teacher: Which is the largest animal?

Students: The whale is the largest animal.

Teacher: Which is the largest amphibian?

Students: The Japanese salamander is the largest amphibian.

Teacher: Which is the largest fish?

Students: The whale shark is the largest fish.

(Oral drills similar to these may be used for reinforcement.)

KNOW A NAME GAME

This technique may be used for teaching the names of animals. The teacher may use the transparency with the animals shown thereon and point to each animal when necessary. The activity may be varied by using the numbers instead of the names of animals. Students can be asked to walk up to the screen and name some of the animals. The teacher may want to make it a little more challenging by asking them to point to any animal and to tell all he knows about that animal.

1. Pass out copies of the sheet with 12 blank squares.

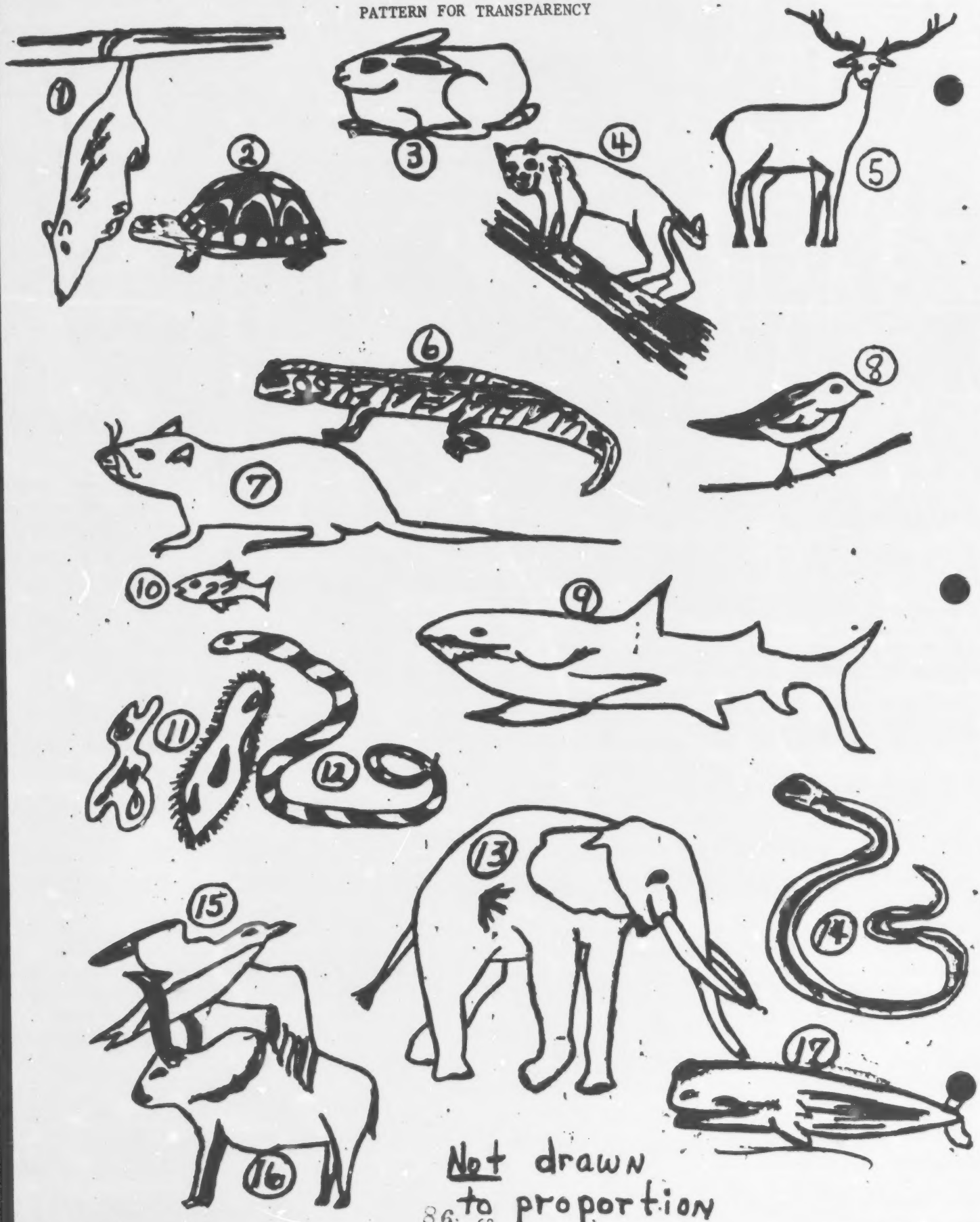
2. Show transparency on screen.

3. Have students fill in each square with the name of an animal they have studied. Any name may be placed in any square.

4. After each student has filled in his form, the teacher will point to any animal shown on the transparency. Do not give the name. If the student knows the name, he should check his square containing that name if he has listed it. The student who checks off the four in the middle of his sheet first, wins the game.

(whale)	(tortoise)	(fish)
(cheetah)	(bird)	(deer)
(buffalo)	(snake)	(opossum)
(salamander)	(amoeba)	(rabbit)

PATTERN FOR TRANSPARENCY



Not drawn to proportion

THE HUMAN EAR

Level:

Grades 7 - 12

Objectives:

1. The student will be able to label a drawing of a human ear.

2. The student will be able to name orally the parts of the ear.

Level of Communication:

Group

Procedure:

The teacher will use simple substitution and transformation drills in this activity.

1. Substitution Drill

Teacher: This is an anvil. (Teacher will point to the anvil and ask the students to repeat as a class, then as a group, and fir lly as individual students.)

Students: This is an anvil.

Teacher: This is an auditory nerve.
auditory canal.
ear drum.

Students: (Repeat each substitution in sentence form after the teacher gives the statement.)

Teacher: This is a hammer.
stirrup.
semicircular canal.
cochlea.

Students: (Repeat each substitution after the teacher gives the statement)

2. Transformation Drill

Teacher: (Teacher will point to different parts as she asks for a response.)

Is this a hammer? ...a stirrup? ...a semicircular canal? ...a cochlea?

Students: Yes (or no), this is (is not) a hammer. ...a stirrup. ...a semicircular canal. ...a cochlea.

Teacher: Is this an auditory nerve? ...an auditory canal? ...an anvil? ...an eardrum?

Students: Yes (or no), this is (is not) an auditory nerve. ...an auditory canal. ...an anvil. ...an eardrum.

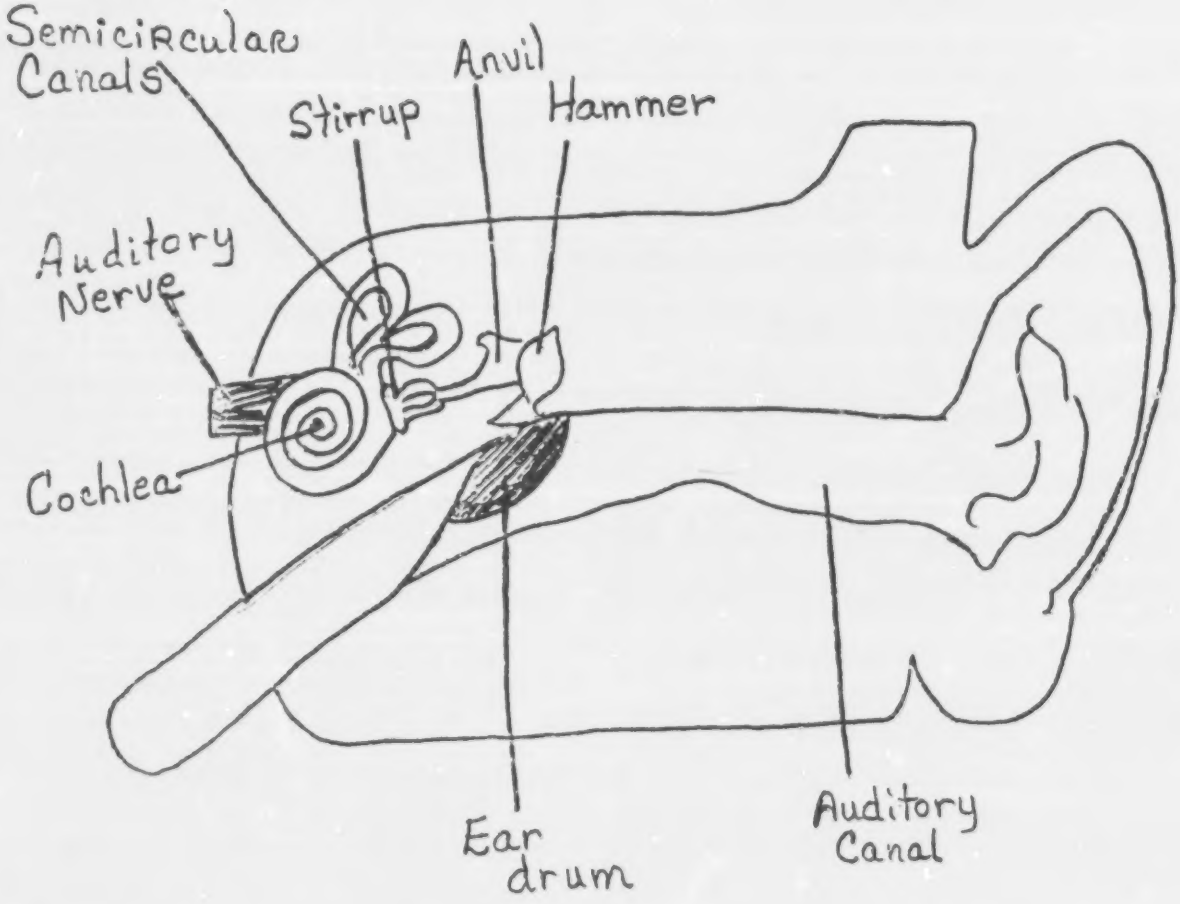
Materials:

Labeled drawing of human ear
Unlabeled drawings of the human ear

Evaluation:

Give each student a drawing of the human ear without labels and have him identify, locate, and label the different parts.

The Human Ear



THE SKELETAL SYSTEM

Level:

Grades 7 - 12

Objective:

The student will be able to name some parts of the human skeleton.

Level of Communication:

Group

Procedure:

The teacher will use repetition and response drills in both English and Spanish in this activity (see attached definitions and drawings).

Repetition Drill:

Teacher: The skeleton is the framework of the body.

Students: Repeat several times.

Girls: The skeleton is the framework of the body.

Boys: The skeleton is the framework of the body.

Teacher: (en español) El esqueleto sostiene el cuerpo.

Students: El esqueleto sostiene el cuerpo.

Teacher: Repita en inglés. The skeleton is the framework of the body.

Students: The skeleton is the framework of the body.

Response Drill:

Teacher: What is a cartilage?

Students: A cartilage is a smooth, tough, flexible tissue.

Girl: A cartilage is a smooth, tough, flexible tissue.

Boy: A cartilage is a smooth, tough, flexible tissue.

Drills should continue until most students can respond automatically with acceptable pronunciation.

Materials:

Definition sheet (English or Spanish)
Drawings of parts of skeleton

Evaluation:

Give each student a drawing of the skeleton (without labels) and have him identify, locate and label each part.

THE SKELETON SYSTEM

Defiritions:

SKELETON - Framework of the body (support, movement, protection)

CARTILAGE - Smooth, tough, flexible tissue

LIGAMENT - Fibers of strong tissue which connect bone to bone

JOINTS - Between bones to allow different degrees of movement

BONE - Hard tissue made up of calcium and phosphorus

TENDONS - Tough connective tissue that connects muscle to bone

Definiciones:

ESQUELETO - El armario del cuerpo (los huesos que sostienen el cuerpo)

CARTILAGO - Tejido liso, duro y flexible

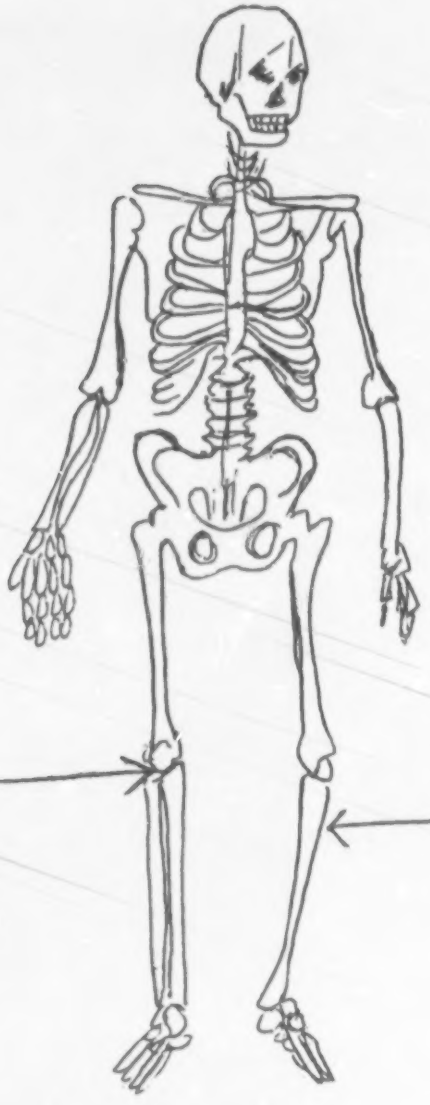
LIGAMENTOS- Las fibras de tejido fuerte que uñen hueso con hueso

COYUNTURAS- La material en medio de los huesos que permite movimiento

HUESO - Material dura que está compuesto de calcio y fósforo

TENDONES - Tejido fuerte que uñen los músculos a los huesos

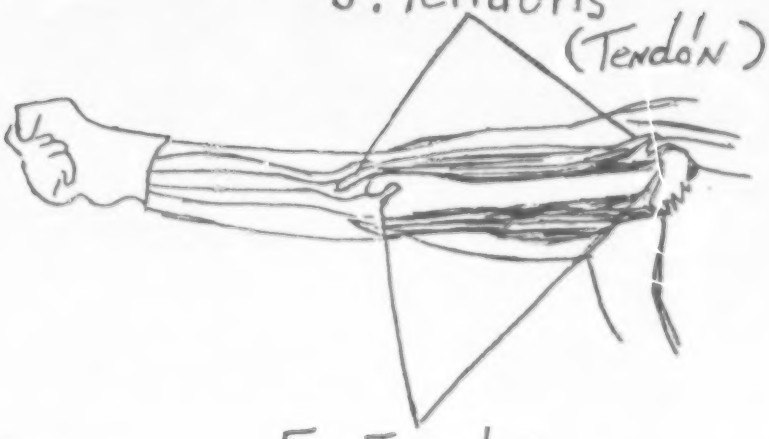
1. Skeleton
(Esqueleto)



3. Ligament
(Ligamento)

4. Bone
(Hueso)

2.
Cartilage
(Cartílago)



6. Tendons
(Tendón)

5. Joints
(Coyuntura)

DIGESTION

Level:

Grades 7 - 12

Objective:

The student will be able to understand the changes, and where they occur, in starches, proteins, and fats as they are introduced into the body.

Level of Communication:

Small groups of four or five

Procedure:

The teacher will pass out copies of each of the attached lab sheets. Then, after presenting the concepts for each lab according to the ESL methodology described within, the teacher will have the groups of students do the lab dealing with each set of concepts as they are presented.

Materials:

Lab sheets (English and Spanish)

Evaluation:

The questions at the end of each lab may be used for evaluation.

CONCEPTS ON DIGESTION FOR USE IN THE REPETITION AND TRANSFORMATION DRILLS

Introduce these concepts before each lab.

FATS lab

1. Bile is a chemical in the liver that helps break down fats.
2. Alcohol cannot break down fats.
3. Lemon juice cannot break down fats.
4. Bile can break down fats.
5. Liquid detergent can break down fats.

PROTEIN lab

1. Water cannot digest protein.
2. Pepsin cannot digest protein.
3. Hydrochloric acid cannot digest protein.
4. Pepsin and HCl together can digest protein.

STARCH lab

1. Starch changes to sugar when it is digested.
2. Iodine can indicate the presence of starch.
3. Benedict's Solution with saliva can change starch to sugar.

CONCEPTOS SOBRE EL SISTEMA DIGESTIVO

Introduce these concepts before each lab.

Laboratorio de GRASA –

1. La bilis es un químico en el hígado que disuelve las grasas.
2. El alcohol no puede disolver ni las grasas ni el aceite.
3. El jugo de limón no puede disolver ni las grasas ni el aceite.
4. La bilis puede descomponer las grasas y la escencia.
5. La detergente líquida puede descomponer las grasas y los aceites.

Laboratorio de PROTEÍNA-

1. El agua no puede digerir las proteínas.
2. La enzima pepsina no puede digerir las proteínas.
3. El ácido clorhídrico no puede digerir las proteínas.
4. La pepsina junto con la acción del ácido clorhídrico puede digerir las proteínas.

Laboratorio de ALMIDON –

1. El almidón se cambia a azúcar cuando está digerido.
2. El iodo puede indicar la presencia del almidón.
3. La Solución Benedict unido con saliva puede cambiar el almidón al azúcar.

DRILLS ON DIGESTION CONCEPTS USING ESL METHODOLOGY

I. Repetition Drill

Teacher: Bile is a chemical in the liver that helps break down fats.

Students: Bile is a chemical in the liver that helps break down fats.

Teacher: Bile is a chemical in the liver that helps break down fats.

Boys: Repeat

Girls: Repeat

Individual: Repeat

(Follow through with the concepts at the beginning of each lab)

II. Transformation Drill

Teacher: Alcohol cannot break down fats.

Students: Alcohol cannot break down fats.

Teacher: Can alcohol break down fats?

Students: No, alcohol cannot break down fats.

Teacher: Can alcohol break down fats?

Answer: (by the individual or specific group called on) No, alcohol cannot break down fats.

(The teacher will continue drill by using the other substances in the concepts and changing 'cannot' to 'can' appropriately.)

LABORATORY INVESTIGATION

FATS IN DIGESTION

Bile is a chemical compound in your liver that helps to break down fats so digestion can occur more easily. The fats are changed into a form that can be used by the body for energy.

Purpose:

1. To determine what substances can best break down fats.
2. To determine how this action is related to the human digestive system.

Materials:

Tin can	Bile solution
Masking tape	Lemon juice
Alcohol	Five medicine droppers
Newspaper	Oil (fat)
Five test tubes	Liquid detergent

Procedure:

1. Label five test tubes A, B, C, D, and E and place in a tin can.
2. Add one inch of water to each test tube.
3. With a medicine dropper, place four drops of oil in each test tube. Observe if the oil remains on the top or goes to the bottom of the water.
4. Add the following to the designated test tube:

   Tube A - Nothing
   Tube B - 5 drops of alcohol
   Tube C - 5 drops of bile solution
   Tube D - 5 drops of lemon juice
   Tube D - 10 drops of liquid detergent

5. Place your thumb over the opening of the test tube and shake the tube five times.
6. Replace the tubes in the can and allow them to stay undisturbed for ten minutes.
7. Note the appearance of each tube. If the mixture is cloudy, some of the fat has broken down and mixed with the water. To judge the appearance of each tube, hold it in front of a newspaper page. The greater the fat breakdown, the less clear the print will appear through the tube.

Questions:

1. Which chemicals caused oil to break down the most?

2. Which were the tubes with cloudy mixtures?

3. Which chemicals used in the test tubes are not produced in the digestive system?

4. What do you think is the purpose of bile in the digestive system?

5. What caused the separation between oil and water in test tube C?

6. Is oil heavier than water? How do you know?

7. Why is detergent important for washing grease from clothes?

LA DIGESTIÓN DE LAS GRASAS

EXPERIMENTO PARA EL LABORATORIO

La bilis es un compuesto químico en el hígado que ayuda en la desintegración de las grasas y aceites para que pueda ocurrir el proceso de digestión. La bilis emulsiona las diminutas gotas de grasa y así son desintegradas más facilmente por las enzimas que las digieren. Así, el cuerpo la convierte en energía.

Objeto:

1. Determinar cuáles jugos pueden disolver las grasas y los aceites.
2. Indique lo que significa esta proceso en relación al sistema digestivo de humano.

Materiales:

Lata	Cinco tubos de laboratorio
Cinta (masking)	Solución de bilis
Alcohol	Jugo de limón
Papel del periódico	Cinco cuentagotas
Aceite	Detergente líquida

Procedimiento:

1. Ponga rótulo a cinco tubos A, B, C, D, y E y pónganlos en una lata.
2. Añada una pulgada de agua a cada tubo.
3. Con cuentagotas, añada cuatro gotas de aceite a cada tubo. Observa si se quede el aceite encima del agua o si se caiga al fondo.
4. Añada los siguientes a cada tubo:

   Tubo A - nada
   Tubo B - cinco gotas de alcohol
   Tubo C - cinco gotas de solución de bilis
   Tubo D - cinco de jugo de limón
   Tubo E - decena gotas de detergene líquida

5. Cubra cada tubo con el dedo y agítelo 5 veces.
6. Así deje los tubos 10 minutos sin moverlos.
7. Nota la apariencia del tubo. Si esta nublado la mezcla, parte de la grasa ha integrado con el agua. La prueba: Examine cada solución con el tubo enfrente del papel. ¿Es nubloso o claro el líquido? ¿Puede leer las letras del periódico?

Preguntas:

1. ¿Cuáles químicos disintegran más el aceite?
2. ¿Cuáles tubos contienen las mezclas nubladas?
3. ¿Cuáles de los químicos usados en el experimento no existen en el sistema digestivo?
4. ¿Qué es la función de la bilis en el sistema digestivo?
5. ¿Qué causó la separación del aceite y el agua en el tubo C?
6. ¿Es el aceite más pesado que el agua?
7. ¿Por qué es importante la detergente para lavar la ropa grasienta?

LABORATORY INVESTIGATION

PROTEIN IN DIGESTION

Purpose: To determine those chemical conditions necessary for protein digestion.

Materials:

- Pepsin
- Four test tubes
- .2% hydrochloric acid (HCl)
- Egg (hard boiled)
- Knife
- Beaker or large can
- Labels or tape
- Medicine dropper

Procedure:

1. Prepare a hard boiled egg. Cut from the egg white four equal sized cubes about 1/4 of an inch square.
2. Label four test tubes A, B, C, and D.
3. Add the following ingredients to the tubes designated:

   Tube A - 1 piece of egg white, 10 ml water
   Tube B - 1 piece of egg white, 10 ml pepsin
   Tube C - 1 piece of egg white, 10 ml HCl
   Tube D - 1 piece of egg white, 10 ml pepsin and 2 drops HCl

4. Stand all four tubes in a can. Place in a warm place over night.
5. On the second day, record the results as follows:

Test tube	Outside appearance of egg white			Check space if protein digestion occurred
	No Change	Fuzzy	Clear	
A				
B				
C				
D				

Questions:

1. Why is egg white used in this experiment?
2. Why don't pepsin and acid in the stomach digest the stomach cells?
3. Why didn't digestion occur in tubes A, B, or C?
4. If you waited for 48 or 72 hours, would all the egg white disappear from tube D?

LA DIGESTIÓN DE PROTEÍNAS

EXPERIMENTO PARA EL LABORATORIO

Objeto: Determinar las condiciones de la digestión de proteína.

Materiales:
Pepsina
Cuatro tubos de laboratorio
.2% ácido clorhídrico
Huevo (hervido)
Cuchillo
Vaso picudo o una lata grande
Rótulos o cinta marcada
Cuentagotas

Procedimiento:

1. Corte en 4 pedazos la parte clara del huevo (en cubo de 1/4 de una pulgada).
2. Ponga rótulos a los tubos A, B, C, and D.
3. Añada los siguientes a cada tubo:

   Tube A - Un cubo de huevo, 10 ml agua
   Tube B - Un cubo de huevo, 10 ml pepsina
   Tube C - Un cubo de huevo, 10 ml ácido clorhídrico
   Tube D - Un cubo de huevo, 10 pepsina y 2 gotas ácido clorhídrico

4. Pongan los tubos en un grande vaso picudo o en una lata. Déjelos en un lugar cálido durante la noche.
5. El próximo día, escriba los resultos.

Tubo	Apariencia del huevo			Escriba "Si" si ocurrió la digestión de la proteína
	Ningún cambio	velloso	claro	
A				
B				
C				
D				

Preguntas:

1. ¿Por qué está usado el huevo en este experimento?
2. ¿Por qué no destruyen las células del estómago la pepsina y el ácido que existen en el sistema digestivo?
3. ¿Por qué no ocurrió digestión en los tubos A, B, o C?
4. ¿Si se esperaría 48 horas o 72 horas, desaparecería la parte clara del huevo en el tubo D?

LABORATORY INVESTIGATION

STARCH IN DIGESTION

Purpose: To determine the effect of saliva on starch (soda cracker).

Materials:

- Three soda crackers
- Two test tubes
- Benedict's Solution
- Heat source
- Test tube holder
- Medicine dropper
- Iodine solution
- Graduated cylinder

Procedure:

1. Put a drop of iodine solution on a soda cracker and note any change. This is a test for starch.
2. Chew a soda cracker for ten seconds and spit it into the bottom of a test tube.
3. Break up another soda cracker into small pieces and place it in the bottom of a second test tube.
4. Add 5 ml of Benedict's Solution to each test tube.
5. Heat to boiling by holding the test tubes in the flame. When heating do not point the open end of the test tube toward anyone.
6. Observe any color change. This is the test for certain sugars, such as glucose.
7. Note your conclusions on your paper.

Questions:

1. What kind of change occurred, chemical or physical?
2. What color does the brown iodine turn when it is placed on the cracker?
3. What color does the blue Benedict's Solution turn when it is heated? ...with the chewed cracker? ...with the unchewed cracker?
4. Into what substance does starch change when it is digested?

LA DIGESTIÓN DEL ALMIDÓN

EXPERIMENTO PARA EL LABORATORIO

Objeto: Determinar la acción química que occure dentro la saliva y las formas de almidón (como una galleta de sal).

Materiales:

- Tres galletas de sal
- Dos tubos de laboratorio
- Solución Benedict
- Mechero de Bunsen
- Portalámpara para el mechero
- Cuentagotas
- Solución de iodo
- Cilindro graduado

Procedimiento:

1. Ponga una gota de solución de iodo en una galleta de sal y note que cambios ocurren. Es una prueba para determinar la presencia del almidón.
2. Mastique una galleta de sal para 10 segundos. Ponga la galleta masticada en un tubo.
3. Ponga otro galleta migada en el otro tubo.
4. Añada 5 ml de Solución Benedict en cada tubo.
5. Empiece a calentar los tubos hasta que las soluciones están herviendo. (Fíjese que la abertura no esté dirigida a ninguna persona.)
6. Observe cambios de color. Esta es la prueba para determinar la presencia de azúcar (la glucosa).
7. Refiera a la página de conceptos.

Preguntas:

1. ¿Qué cambio ocurrió (químico o físico)?
2. ¿A qué color cambia el iodo cuando está puesto en la galleta de sal?
3. ¿A qué color cambia la Solución Benedict cuando está calentado? ¿Con la galleta masticada? ¿Con la galleta que no está masticada?
4. ¿A qué materia cambia el almidón cuando está digerido?

THE FLOWERS AND SEEDS

Level:

Grades 7 - 12

Objectives:

1. The student will be able to label the parts of the flower and state the purpose of each, including the parts and purposes of seeds.

2. The student will be able to write responses to questions about the process of pollination and fertilization.

Level of Communication:

Group, individual

Procedure:

The teacher will hand the student his own worksheet (Spanish or English) with the instructions provided at the beginning of the lesson.

Materials:

Worksheet on flowers and seeds in English and in Spanish

Evaluation:

Drawings of the flower and seeds will be given to student to label and identify functions.

WORKSHEET ON FLOWERS AND SEEDS

Instructions

This worksheet is to be done in the following manner:

1. Read the short paragraph very carefully.
2. Read the questions below the paragraph.
3. Read the paragraph once more with the questions in mind.
4. Answer the questions asked about the paragraph in the space provided.

I. FLOWERS

Flowers reproduce angiosperm plants. Hence angiosperms are known as flowering plants.

A flower is an organ whose function is to reproduce the plant. A flower is actually a modified, or changed, branch that bears petals and reproductive organs. Petals are similar in structure to leaves.

What are the parts of a flower? A complete flower contains petals, sepals, stamens, and a pistil. The sepals are a ring of green, leaflike structures on the underside of a flower. Sepals enclose the parts of a flower before the flowerbud opens and support the flower after it opens. Stamens and pistils in the center of the flower, surrounded by petals, are the reproductive organs. In reproduction, seeds are formed inside the pistil.

An incomplete flower has one or more parts missing. For example, flowers of many common trees do not have sepals or petals. Some plants, such as the corn plant, bear two different incomplete flowers. Flowers with stamens are in the tassel at the top of the plant. Flowers with pistils are in the ears of the corn plant.

1. What are angiosperms?

2. What is the function of a flower?

3. What are petals?

4. Name two types of flowers.

II. POLLINATION AND FERTILIZATION

Complete flowers produce pollen grains, egg nuclei, and ovules. A pollen grain is a specialized reproductive structure produced by a stamen. An egg nucleus is a specialized reproductive structure produced within a spherical-shaped ovule. The ovule is located inside the ovary of the pistil.

For reproduction to occur, both pollination and fertilization must take place. Pollination is the transfer of pollen from stamen to pistil. Fertilization is the fusion, or union, of two sex cells.

Pollination may be accomplished by wind, water, or insects. Pollination within the same flower is called self-pollination. Pollination in which pollen is carried from one flower to another is known as cross-pollination.

In pollination, a pollen cell lands on the stigma, the very top part of the pistil. A nucleus from the pollen cell remains near the tip of this pollen tube during its growth to the ovule.

A fertilized egg cell, zygote, grows by cell division to form an embryo plant.

1. What is a pollen grain?

2. Where is the egg nucleus located?

3. Where is the ovule found?

4. What is pollination?

5. What is fertilization?

6. How is pollination accomplished?

7. What is the difference between self-pollination and cross-pollination?

8. What is a stigma?

9. What is a zygote?

III. SEEDS

Every seed contains seed coats and an embryo. Some seeds contain endosperm, a tissue having stored food.

Seed coats develop from the wall of the ovule. The hilum on a seed is the scar left at the point where the seed was attached to the fruit. Cotyledons are seed leaves that form part of the embryo plant. Cotyledons digest and absorb the endosperm, making the endosperm food available for the growth of the embryo plant.

1. Draw and label the two types of seeds on your own paper. (Use the drawings on the last sheet)

2. Below your drawings, tell the function of each of the parts you have labeled.

IV. GERMINATION AND SEED DISPERSAL

The early growth of a plant from a seed is called germination. For germination to occur, there must be favorable temperature and moisture. Also, there must be an adequate supply of oxygen.

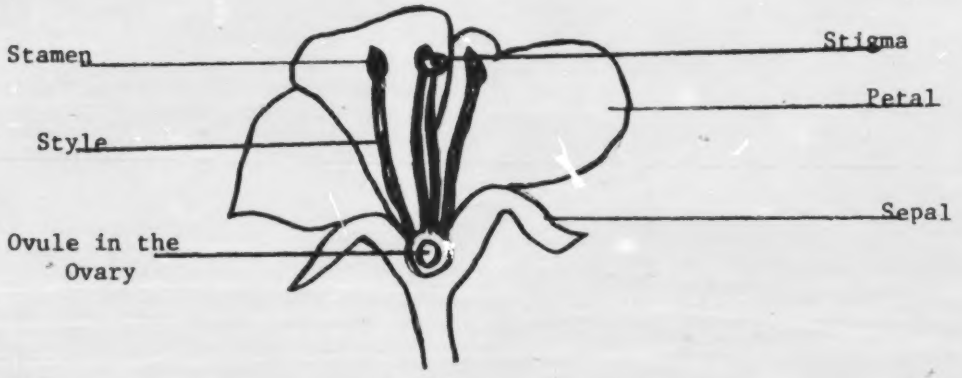
Fruits and seeds are carried away from plants in a wide variety of ways. Animals, wind, and water are responsible for the dispersal of many kinds of seeds.

Seed dispersal methods account for the spreading of seed plants across the earth. Although seed dispersal is not important to an individual plant, it is essential for the survival of the plant species.

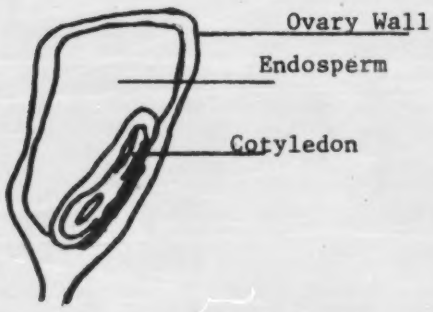
1. What are the necessary conditions for germination to occur?

2. What factors are responsible for seed dispersal?

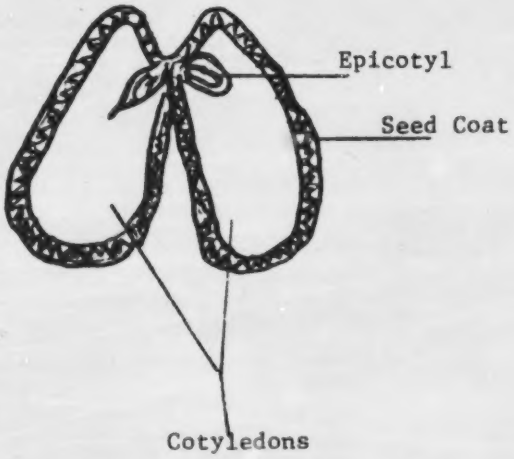
Parts of a Typical Flower



Parts of a Seed



Monocotyledon Seed
(One cotyledon)



Dicotyledon Seed
(Two cotyledons)

HOJA DE TAREA SOBRE LAS FLORES Y LAS SEMILLAS

Instrucciones

1. Lea los párrafos.

2. Lea las preguntas debajo de cada párrafo.

3. Lea, por segunda vez, el párrafo y piense en las preguntas.

4. Conteste las preguntas debajo de cada párrafo.

I. Hay dos clases principales de plantas con semilla. Un grupo, las gimnospermas, es aparentemente más antiguo y primitivo. La mayor parte de las plantas pertenacientes a este grupo producen semillas en conos, de donde proviene su nombre de coníferas. La segunda clase de plantas con semilla la forman las angiospermas que presentan una mayor amplitud de grupos. Se les conoce con el nombre de plantas con flores. Existen algunas diferencias básicas en los mecanismos reproductores entre coníferas y plantas con flores, pero en general los modelos de reproducción son basicamente similares.

1. ¿Cuáles son las dos clases principales de plantas con semilla?

2. ¿Cuáles son las características de los gimnospermas?

3. ¿Cuáles son las características de las angiospermas?

II. ESTRUCTURA DE UNA FLOR

Un flor es un órgano reproductor altamente organizado y maravillosamente eficiente. Examinaremos cuidadosamente una de ellas. (Vea la última página.)

Si una flor es coloreada y atractiva será probablemente a causa de sus sépalos o pétalos. Los sépalos son las estructuras más externas de la flor y no están tan llenas de color como los pétalos.

Las estructuras más importantes de la flor son los estambres y el pistilo. El estambre está considerado como la estructura masculina de la flor. Tiene dos partes: un filamento largo y un recipiente como saco que contiene el polen, llamado antera. Generalmente cada flor tiene varios estambres. El pistilo se considera como la parte femenina de la flor. La parte más baja del pistilo es el ovario. Es la estructura donde se forman los óvulos, donde son fecundados y donde el cigoto finalmente se convierte en semilla. Encima del ovario se levanta un delgado estilo que termina en una alargada y, a menudo pegajosa, area llamada estigma. El polen del estambre debe caer en el estigma ante de producirse alguna fusión entre los gametos. Este acontecimiento se llama polinización y constituye uno de los pasos críticos en el ciclo de reproducción sexual de las plantas con flores. La polinización debe preceder a la fecundación.

1. ¿Qué es una flor?

2. ¿Qué son los sépalos de una flor?

3. ¿Qué es el estambre?

4. ¿Qué es el pistilo?

5. ¿Qué es polinización?

6. Dibuje la flor y nombre sus partes.

III. POLINIZACIÓN

Flores perfectas son las que producen los gametos masculino y femenino. Hay flores que sólo producen una clase de gametos; estas son flores imperfectas. Cada una de las cuales son estaminíferas, conteniendo solamente uno o más estambres; pistiladas, teniendo solo uno o más pistilos. La información genética no se dispersa a través de la población. Como resultado de esto no existe gran modificación en las variedades como en aquellas de polinización cruzada.

1. ¿Qué son flores perfectas?

2. ¿Qué son flores imperfectas?

IV. FECUNDACIÓN

Polinización y fecundación son dos cosas distintas. La polinización se completa cuando un grano de polen de la clase adecuada está trasladado estigma de una flor. Varias cosas deben suceder ante de la fecundación; una de ellas es la fusión de los gametos.

1. ¿Cómo se completa la polinización?

2. ¿Qué sucede en la fecundación?

V. GERMINACIÓN

Las semillas de las plantas varían en sus modelos de desarrollo. Dos modelos básicos predominan. Hay uno o dos cotiledones que son llamados Hojas de Semilla. Están adheridos a un eje diferenciado en tres regiones distintas. La parte del eje sobre los cotiledones es el epicotiledon. Esta región se alarga y desarrolla en el tallo de la planta. La parte más baja del eje es la radícula que alargandose desarrollara el sistema de raíces de la planta. (Vea el dibujo en la última página.) La región que a manera de tallo está entre la radícula y el epicotiledon es el hipocotiledon. Esta región puede alargarse en el período de germinación.

Hay dos modelos básicos de desarrollo en el período de germinación; se distinguen por el número de cotiledones en el embrión y sirven como base para

la división de las plantas con flores en dos subgrupos principales. Las plantas cuyas semillas desarrollan un solo cotiledon se llaman monocotiledoneas y las plantas con dos cotiledones, dicotiledoneas. El maíz es una planta monocotiledonea. El frijol es una planta dicotiledonea.

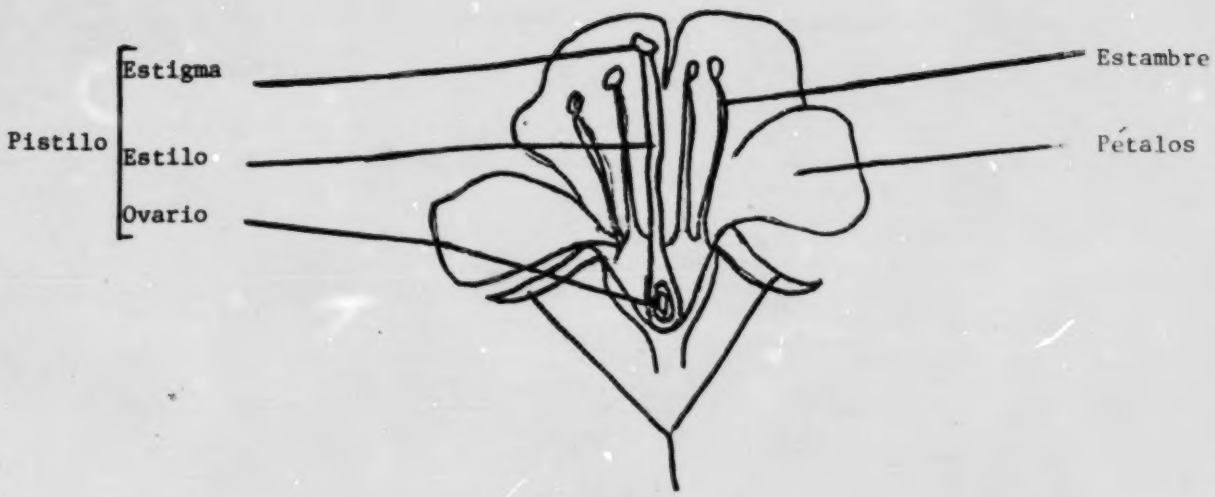
1. Describa los dos modelos básicos del desarrollo de la semilla.

2. Describa dos modelos básicos del desarrollo de la semilla en el periódo de germinación.

3. Dibuje y nombre las partes de una semilla de frijol y un grano de maíz.

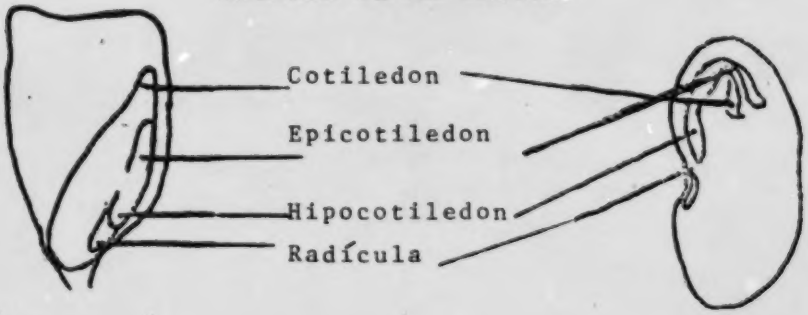
Reference: Smallwood and Green. *Biologia*

DIAGRAMA DE UNA FLOR COMPLETA



Embrión de la planta de una semilla de frijol y de un grano de maíz

EMBRIÓN DE LA PLANTA



Grano de Maíz

Semilla de Frijol

2. Types of rock in the crust of the earth:

   a. Igneous rock is rock which has been molten at some time in the past. Igneous means "formed by heat." The most common igneous rock is granite.

   b. Sedimentary rock is found on the bottom of oceans, lakes, or large flat plains. The sediment (bits of rock and soil) settles after being carried by water which has picked it up from various sources. The material becomes cemented together and sedimentary rock is formed. Sandstone is formed by the settling and cementing together of tiny pieces of sand. Shale is formed by the settling and cementing together of clay particles. Limestone is formed by the settling and cementing of bones and shells of ocean creatures. (Fossils are often found in sedimentary rocks. They are the remains of plants and animals that lived many years ago.)

   c. Metamorphic rock apparently has undergone high temperatures and/or pressures in the past. Scientists are not sure about the origin of these rocks. Metamorphic means changed in form and perhaps they were once sedimentary or igneous rocks. Marble is a metamorphic rock.

(Visuals are an alternative to translation in explaining how each type of rock is formed)

3. Teacher will give the following questions (might be presented as fill-in-the-blank exercises) for short written answers:

   a. Which are the three layers of the earth?

   b. How many layers are in the mantle?

   c. Is the crust thicker in the ocean basins or in the areas of the continents?

   d. Where is the Mohorovicic Discontinuity?

   e. What are the three kinds of surface rocks?

   f. How is sandstone formed?

   g. How is limestone formed?

   h. What are fossils? Why are they found in a certain kind of rock?

4. The teacher will use the following pattern drills for review:

Teacher	Student
One type of metamorphic rock is marble.	Repeat
One type of sedimentary rock is sandstone.	Repeat
shale.	Repeat
limestone.	Repeat
One type of igneous rock is granite.	Repeat

Teacher	Student
The core is 2,900 kilometers below the surface.	Repeat
The mantle is about 30 km below the surface.	Repeat
The Moho is about 30 km below the surface.	Repeat
Where is the Moho?	The Moho is 30 km below the surface.
Where is the core?	The core is 2,900 km below the surface.
Where is the mantle?	The mantle is 30 km below the surface.
The core is thicker than the crust.	Repeat
The crust is cooler than the mantle.	Repeat
The mantle is the thickest of all.	Repeat
(Continue with hotter, heavier, lighter, etc.)	
Which is thicker, the mantle or the core?	The core...
Which is hotter, the crust or the mantle?	The mantle...
(Continue)	
How many layers are there in the earth?	Repeat
There are three layers in the earth.	Repeat
How many layers are there in the mantle?	There are...
How many kilometers are there in the crust?	There are...

5. Recombination - The students will rewrite two simple sentences into a complex or compound sentence.

   Example: The bits of rock and soil were in the water. The bits of rock and soil settled.

   Recombination: The bits of rock and soil which were in the water settled.

   a. Igneous rock was molten at one time. Igneous means "formed by heat."

   b. The continents are part of the crust. The continents are 5 to 30 kilometers deep.

   c. Limestone is a sedimentary rock. Sedimentary rock is formed by the settling and cementing of bits of rock and soil.

   d. Fossils are the remains of plants and animals. Fossils are found in sedimentary rock.

Materials:

Transparency showing the structure of the earth.
Ditto copies of the same drawing without the labels.
Rock samples

Evaluation:

Oral and written evaluation measures are included in the procedures above.

La estructura de la tierra

Los científicos usan ondas séismicas (perteneciente a los terremotos o producido por ellos) para estudiar la estructura de la tierra.

Dentro de la tierra existen varias partes distintas. Estos son el corazón (o el centro), el manto, y la capa exterior.

El Corazón o el Centro de la Tierra - el corazón tiene por lo menos dos niveles (strata). El corazón está hecho de materia más densa que el resto de la tierra. Ondas séismicas pasan por el centro más lentamente que en las regiones afuera.

La materia del centro se parece a la materia líquida.

Está hecho de hierro liquiado, con un porcentaje pequeño de níquel.

El centro de la tierra está a 2,900 kilómetros abajo del exterior.

El Manto - Unos científicos piensan que el manto está hecho de dunite y olivine. Estos son minerales densos o pesados. El manto está colocado dentro del corazón (o centro) y el Mohorovicic Discontinuity.

La Capa Exterior - Debajo de los continentes, la capa tiene una densidad de aproximadamente 30 kilómetros. Debajo de los océanos, la capa tiene una densidad de aproximadamente 5 kilómetros.

a. ¿Cuáles son los tres planos (o niveles) de la tierra?

b. ¿Cuántos niveles hay en el manto?

c. ¿Es más espeso la capa exterior debajo de los océanos o debajo de los continentes?

d. ¿Dónde está el "Mohorovicic Discontinuity"?

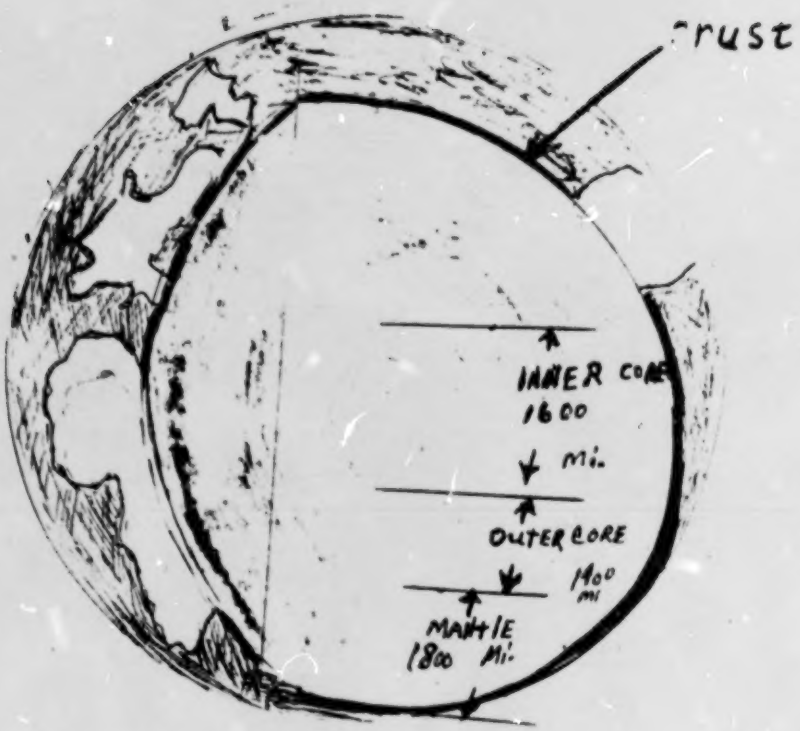
e. ¿Cuáles son los tres tipos de piedras que se encuentran en la superficie de la tierra?

f. ¿Cómo está formada la piedra arenisca (sandstone)?

g. ¿Cómo está formada la piedra caliza (limestone)?

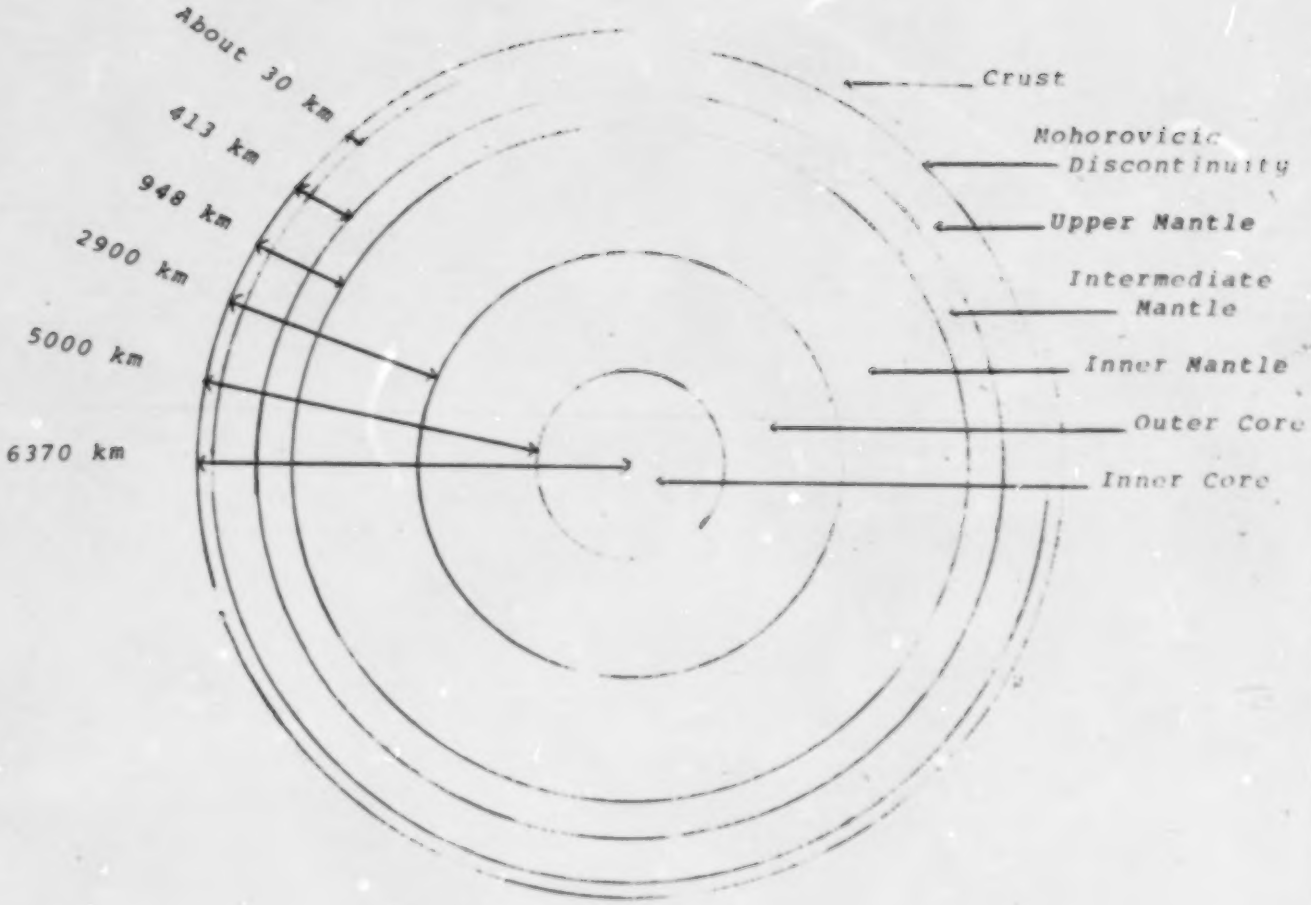
h. ¿Qué son las fósiles? ¿Por qué están formadas en piedra caliza?

PATTERN FOR TRANSPARENCY



PATTERN FOR TRANSPARENCY

STRUCTURE OF THE EARTH



THE WATER CYCLE

Level:

Grades 7 - 9

Objectives:

1. Student will be able to identify the various stages in the water cycle.
2. Student will be able to draw arrows on an outline picture to represent the water cycle.
3. Student will be able to demonstrate the process of capillary action.

Level of Communication:

Individual, group

Procedure:

1. The teacher will model statements explaining and identifying steps in the water cycle (with reference to a transparency similar to the attached example).
2. Students will repeat the concepts orally in a series of repetition drills. The statements on the information sheets and the visual representation should be covered in the oral drills. Ask for large group, small group, and individual response in the oral drills.
3. Students will answer orally and in writing the questions included on the information sheet (a Spanish translation is provided).
4. Students will perform the experiment on capillary action. (See instruction sheet.)

Materials:

Water cycle transparency
Overhead projector
Equipment for the experiment: sugar cubes, powdered sugar, bowl, eye dropper, food coloring

Evaluation:

The attached questions may be used for a written evaluation.
The attached picture of the water cycle may be handed to the students for them to draw arrows showing the water cycle activity.

THE WATER CYCLE

There are three main parts of the water cycle.

1. Evaporation - Water is drawn up into the atmosphere and becomes water vapor.

   a. Plants and animals give off water.

   b. The sun evaporates the water.

   c. The wind speeds evaporation.

2. Condensation - The water vapor continues to rise and becomes water droplets or ice flakes which accumulate to form clouds.

3. Precipitation - As the clouds become cooler, rain, snow, or hail occur. As water hits the earth, it again soaks into the earth or runs off in streams and rivers into lakes and oceans.

THIS CONTINUAL MOVEMENT OF WATER HAS BEEN TAKING PLACE FOR MILLIONS OF YEARS.

Questions:

1. Explain the statement, "Last spring's rain, this winter's snow."

2. What are the three steps in the water cycle?

3. What will happen if you place a glass, open side down, on the grass?

4. What causes evaporation? What are three things that contribute to evaporation?

5. What is ground water?

6. What happens to water vapor as it rises?

EL CICLO DEL AGUA

Hay tres elementos principales en el ciclo del agua:

1. Evaporación - el agua es llevado al aire y es cambiado a vapor.

   a. Plantas y animales emiten agua.

   b. El sol evaporiza el agua.

   c. El viento acelera el proceso de evaporación.

2. Condensación - el aire, caliente y húmedo, asciende y el vapor cambia a gotitas de agua o carámbanos (ice flakes). Se convierten en nubes.

3. Precipitación - cuando baja la temperatura en las nubes, entonces ocurre lluvia, nieve or granizo. El agua es absorbido por la tierra o es llevado en corrientes or riós hasta llegar a grandes lagos u océanos. Este movimiento de agua ha ocurrido por millones de años sin cesar.

Preguntas:

1. Explique el dicho, "La lluvia de la primavera del año pasado es la nieve de este invierno."

2. ¿Cuáles son las tres partes del ciclo del agua?

3. ¿Qué va a ocurrir si se pone un vaso, boca abajo, sobre la zacate (cesped)?

4. ¿Cuáles son las tres cosas que contribuyen al proceso?

5. ¿Qué causa la evaporación?

6. ¿Qué es "ground water"?

7. ¿Cómo cambia el vapor del agua cuando está subiendo el aire?

Los estudiantes dibujarán flechas representando el ciclo del agua. Podrán añadir animales presentes en el campo, el cual representará otro elemento del proceso del agua.

CLASS EXPERIMENT

THE WATER CYCLE - SUPPLEMENTAL ACTIVITY - CAPILLARY ACTION

Soil water is constantly rising to the surface of the ground. Capillary action, the way the water rises in a blotter, a paper towel, or in a tiny glass tube, is one way water works its way up to the surface of the ground. The amount of water brought to the surface by capillary action during dry weather and lost by evaporation may be great enough to prevent proper plant growth.

To help prevent evaporation, a mulch can be made by covering the ground surface with leaves, grass, or straw. In fact, sawdust and even paper spread on the ground will help to protect the roots of plants from loss of soil water. A dust mulch, made by breaking up the top two or three inches of soil, will also help prevent this kind of water loss. The mulch breaks up the tiny tubes which form in closely packed topsoil.

Experiment

Place two cubes of sugar in a shallow dish. Sprinkle a layer of powdered sugar on top of one cube. Slowly add a few drops of colored water to the dish, but be careful not to drop any on the sugar cubes. Does the water rise in the two cubes at the same rate? How does the action of powdered sugar illustrate mulch action on the ground?

Reference: Blanc, Fischler, and Gardner. *Modern Science*, Holt, Rinehart, and Winston, New York, 1971.

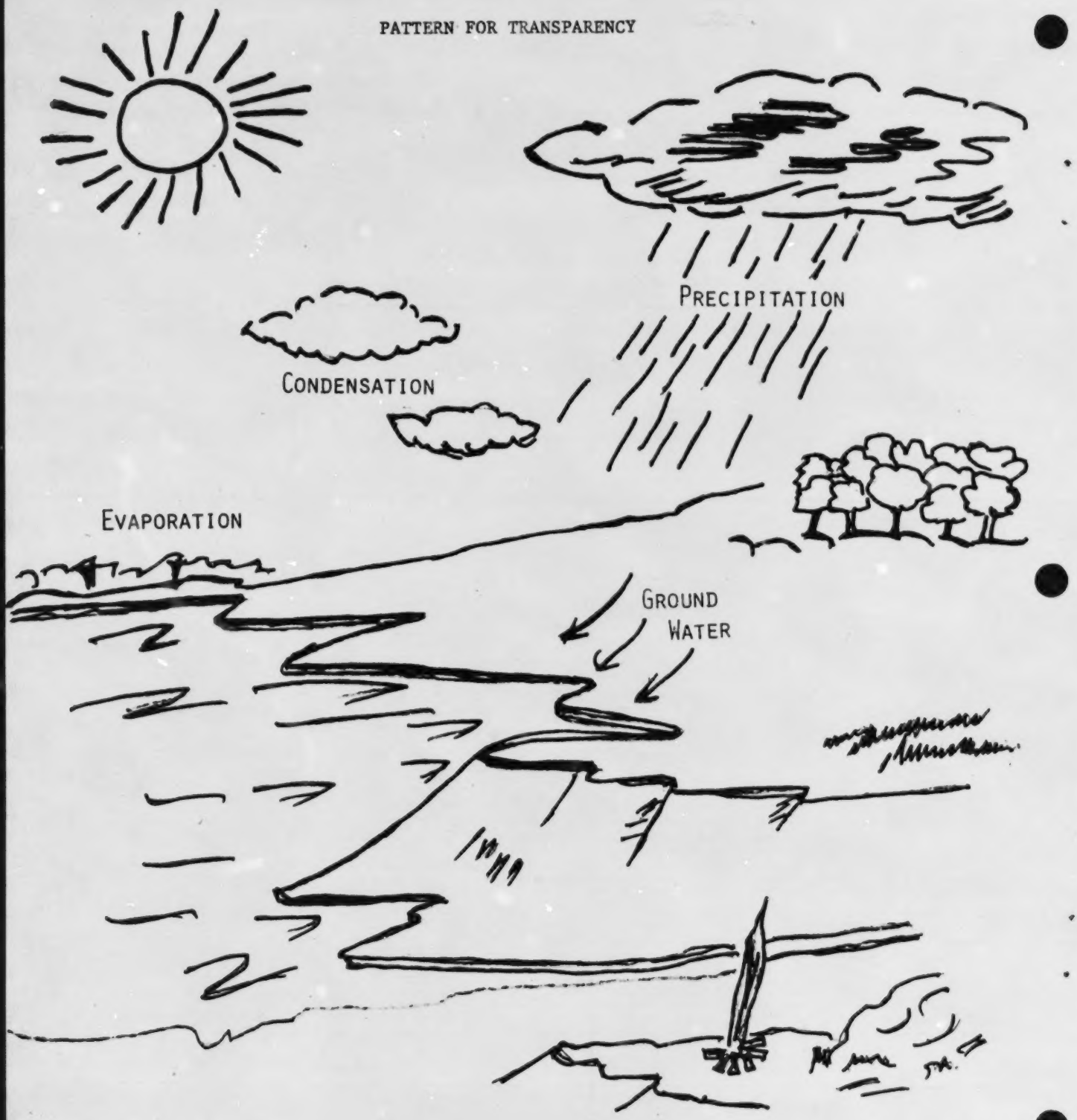
Note: Large pictures or posters representing the capillary action and the mulching process can be used to aid in the explanation (especially for those students who are not proficient in English).

Some Definitions

Capillary action	proceso capilar
Straw	paja
Leaves	hojas
Roots	raíces
Sawdust	aserraduras
Dust	polvo
Inch	pulgada
Mulch	que se echa alrededor de plantas y afboles para conservar la humedad y abrigar las raíces.

THE WATER CYCLE

PATTERN FOR TRANSPARENCY



CLOUD TYPES

Level:

Grades 7 - 9

Objective:

Student will be able to identify cloud types from drawings.

Level of Communication:

Group

Procedure:

1. Teacher will distribute information sheets (English and Spanish).

2. Teacher will present the material included in the information sheets and shown on the drawings. She will use photographs if they are available.

Materials:

Information Sheets
Transparencies
Overhead Projector
Posters
Photographs

Evaluation:

The fill-in-the-blanks question forms attached may be used for evaluation.

CLOUD TYPES

Most clouds form when rising air cools and the water vapor condenses on a dust particle. The clouds are composed of water droplets or ice flakes, depending upon the temperature at which they formed.

CIRRUS Clouds are formed by ice crystals at very high altitudes and have thin, wispy forms. Cirrus clouds sometimes indicate approaching weather changes. They usually form at 25,000 feet or above.

CUMULUS Clouds are usually dome shaped and billowy. They are from two to four miles above the earth. Cumulus clouds have flat bases; they are big and fluffy. They usually indicate fair weather.

STRATUS Clouds are low and flat and form in layers. Sometimes they may be mistaken for fog. They are formed in layers and usually indicate calm weather conditions. They often cover the whole sky and are common in winter.

CUMULONIMBUS Clouds are huge, dark clouds that may reach up to 75,000 feet. They are called "thunderheads" and usually bring storms and heavy rains.

Note: Persons who catalog types of clouds have combined names to designate the great diversity of cloud types that actually exist.

Reference: Blanc, Fischler, and Gardner. *Modern Science*, Holt, Rinehart, and Winston, New York, 1971.

CLASES DE NUBES

Las nubes son agua en transición. La mayoría de las nubes se forman cuando el aire húmedo es impulsado hacia arriba y enfriado por el proceso de dilatación. Su temperatura alcanza el punto de rocío y el vapor se condensa en los núcleos de alrededor.

NUBES CIRROS-Estas nubes presentan el aspecto de fibras extendidas como los hilos de una bandeja. Están formados de cristales de hielo a una elevación muy alta. Estas nubes indican, a veces, un cambio de tiempo. Generalmente se forman a unos 25,000 pies o más.

NUBES CÚMULOS-Llamados "nubes coliflor," son conspicuas por su desarrollo vertical. Por lo general es de forma cúpula; sus bases son planas y se forman amontonadas a lo alto y indican generalmente buen tiempo.

NUBES ESTRATOS-Nubes presentadas en forma de fajas, a poca altura sobre el horizonte. Generalmente indican tranquilidad. Esta clase de nube muchas veces cubre todo el cielo. Ocurren mucho durante el invierno.

NUBES CÚMULONIMBOS-Son cúmulos oscuros y altos, a veces llamados cabezas de tronadas porque forman tormentas.

Note: Los que catalogan las nubes han inventado nombres combinados para describir la gran diversidad de nubes que se presentan en realidad. De aquí aparece nuestro número 4.

DRILL SHEETS

I. Students will be asked to give the names of cloud types, given a visual stimulus, such as photographs, transparencies, or drawings.

II. Repetition Drill - Teacher will give definitions of cloud types, using the backward buildup to reinforce the definitions.

Teacher: Cumulus clouds are usually dome shaped and billowy.
Teacher: billowy.

Student: billowy.

Teacher: dome shaped and billowy.
Student: dome shaped and billowy.

Teacher: are usually dome shaped and billowy.
Student are usually dome shaped and billowy.

Teacher: Cumulus clouds are usually dome shaped and billowy.
Student: Cumulus clouds are usually dome shaped and billowy.

III. Transformation Drill - Teacher will model the transformation.

Teacher: Which clouds are dome shaped and billowy?
Student: Which clouds are dome shaped and billowy?

Teacher: Cumulus clouds are dome shaped and billowy.
Student: Cumulus clouds are dome shaped and billowy.

Teacher: Which clouds bring stormy weather?

Student: Cumulonimbus clouds bring stormy weather.

Teacher: Which clouds form at 25,000 feet or above?

Student: Cirrus clouds form at 25,000 feet or above.

IV. Guided Oral Narration - Teacher will have the student use the following chart (shown on poster board or chalkboard or transparency) as a guide in an oral discussion of cloud types. Students will choose appropriate statements from each column to discuss each type.

CLOUD TYPES	APPEARANCE	HEIGHT	KIND OF WEATHER
Cumulus	Dome shaped	25,000 ft.	Winter
Cumulonimbus	Wispy	75,000 ft.	Changes
Cirrus	Huge	2-4 miles	Storms
Stratus	Thin	Low	Calm
	Billowy		Heavy rains
	Dark		Fair weather
	Layers		
	Thunderheads		
	Fog		
	Fluffy		

It may be necessary to model appropriate structures for the oral narration:

_____clouds are _____. They form at _____.
(kind) (appearance) (height)

_____clouds indicate _____.
(kind) (kind of weather)

V. Questions and Answers (Fill-in-the-blank)

a. _____ clouds are usually dome shaped and billowy.

b. Cumulonimbus clouds may reach as high as _____ feet.

c. _____ clouds sometimes indicate approaching weather change.

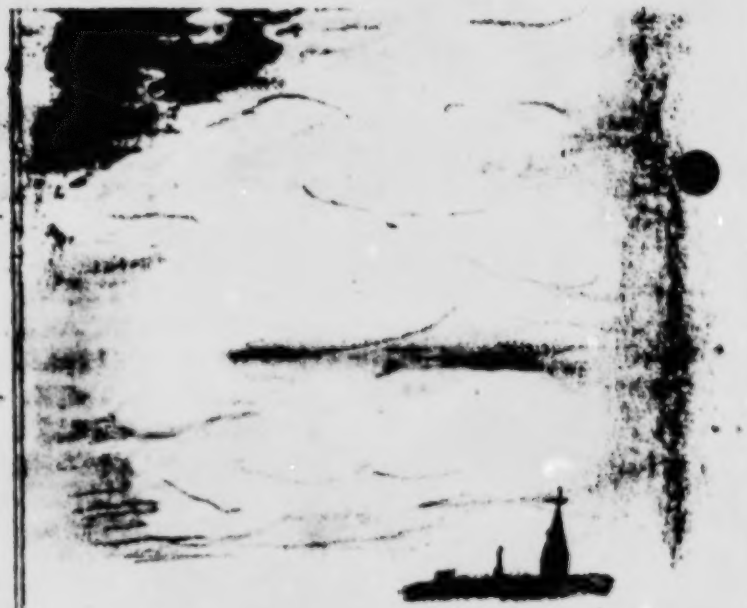
d. _____ clouds are huge, dark clouds.

e. Cirrus clouds are formed by _____ at very high altitudes.

f. _____ clouds are low and flat and form in layers.

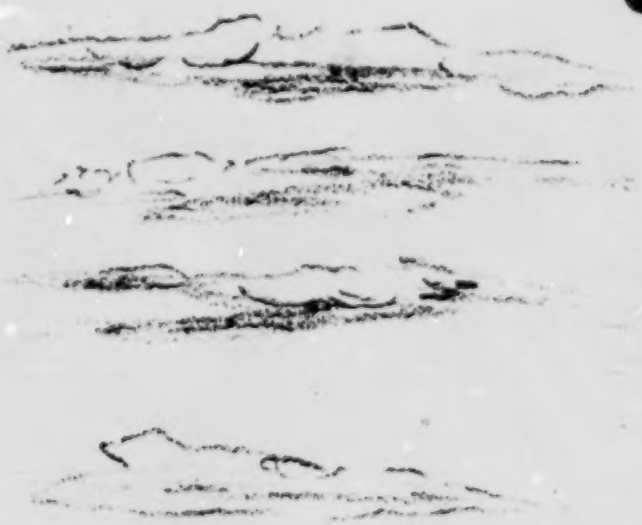
g. Cumulus clouds usually indicate _____ weather.

Cirrus



Nimbus

Cumulus



Stratus

OCEANOGRAPHY

Level:

Grades 7 - 12

Objectives:

1. The student will be able to name orally and label the parts of the ocean floor.

2. The student will be able to respond orally to questions regarding the concepts of oceanography.

Level of Communication:

Group

Procedure:

The teacher will distribute the drawing of the ocean floor and the list of important concepts (English or Spanish) to the students. She will, by use of repetition and response drills, help the students in understanding the concepts of oceanography.

Materials:

Drawings of the formations of the ocean floor (one with labels, one without labels).
List of concepts and understandings of oceanography.

Evaluation:

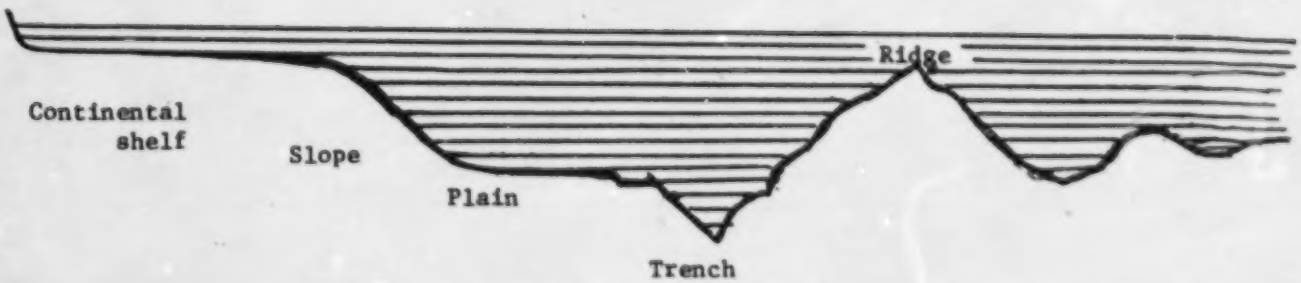
Students will respond in oral drills related to the formations of the ocean floor.

OCEANOGRAPHY

Concepts and Understandings:

1. Oceanography is the science of the study of the ocean.
2. Oceans supply most of the water vapor in the atmosphere.
3. Fresh water can be taken from ocean water.
4. The ocean is an important source of food.
5. The waters of the oceans have changed over the years.
6. Ocean currents receive their energy from the sun and the wind.

FORMATIONS OF THE OCEAN FLOOR

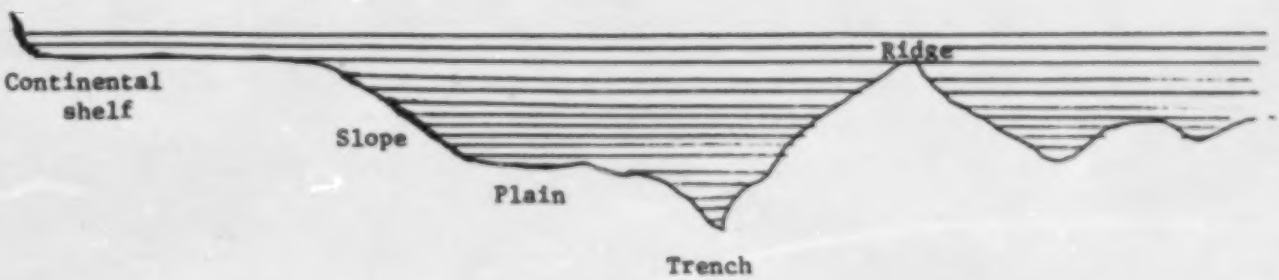


OCEANOGRAFIA

Conceptos Importantes

1. La oceanografía es la ciencia del estudio del océano.
2. Los océanos suplen la major parte del vapor de agua en el atmósfero.
3. Se puede extraer agua puro del agua oceánico.
4. El océano es muy importante como fuente de alimentos.
5. Los océanos han cambiado a través de muchos años.
6. Las corrientes reciben su energía del sol y del viento.

FORMATIONS OF THE OCEAN FLOOR



OCEANOGRAPHY DRILLS

Use ESL methods to interpret the concepts and understandings of oceanography.

Repetition Drill - Teacher will instruct one or more rows or groups, boys or girls, how to respond.

Teacher: Oceanography is the science of the study of the ocean.
Students: Oceanography is the science of the study of the ocean.

or Row: Oceanography is the science of the study of the ocean.

or Individual: Oceanography is the science of the study of the ocean.

Transformation Drill - The teacher will instruct the students when and who is to respond.

Teacher: Is oceanography the science of the study of the ocean?
Student: Yes, oceanography is the science of the study of the ocean.

Teacher: Is oceanography the science of the study of the body?
Student: No, oceanography is not the science of the study of the body.

(The drills may be continued using the other concepts of oceanography.)

(These same drills may be used in teaching the formations of the ocean floor.)

Show the students the drawing of the formation of the ocean floor with the parts labeled. (Use repetition drill.)

Show the students tne drawing of the formations without the parts labeled. (Use transformation drill.)

ASTRONOMY

Level:

Grades 7 - 12

Objectives:

1. The student will be able to identify the planets in our solar system.

2. The student will be able to respond orally to questions about basic concepts concerning the solar system.

Level of Communication:

Group

Procedure:

1. The teacher will present an ESL lesson on astronomy terms and their definitions. (See lesson No. 1.)

2. The teacher can present the crossword puzzle on astronomy.

3. The teacher may present an ESL lesson on the order of the planets. (See lesson No. 2.)

Materials:

ESL lessons No. 1 and No. 2
Crossword puzzle on astronomy
Drawing of the planets

Evaluation:

The students may be given an exam similar to the one included here, either written or oral.

ASTRONOMY LESSON NO. 1 USING ESL

The teacher may present the following lesson with pictures or drawings to illustrate the terms.

1. Backward Buildup

Teacher: Neptune is the planet next to Pluto.
Teacher: to Pluto
Student: to Pluto

Teacher: Neptune is the planet next to Pluto.
Teacher: planet next to Pluto
Student: planet next to Pluto

Teacher: Neptune is the planet next to Pluto.
Student: Neptune is the planet next to Pluto.

2. Repetition Drill

Teacher: Neptune is the planet next to Pluto.
1st row: Neptune is the planet next to Pluto.
Teacher: Neptune...
Boys: Neptune...
Teacher: Neptune...
Girls: Neptune...

3. Astronomy terms and definitions to be used in the exercise. Give each student a copy. Teacher to make the statement and the students to repeat as requested.

a. Neptune is the planet next to Pluto.
b. Earth is the planet we live on.
c. Universe is everything in space.
d. A star is a glowing ball of gases.
e. The moon is the object that orbits around the earth.
f. A galaxy is a collection of stars and solar systems.
g. A crater is a hole on the moon.
h. A telescope is an instrument used to study the universe.
i. A planet is a large object that revolves around a star (the sun).
j. The sun is the main star of our solar system.
k. Astronomy is the study of our solar system.
l. The Milky Way is the galaxy we are in.
m. Saturn is the planet with a ring of gases.
n. Space is emptiness.
o. Polaris is the name of the north star.

ASTRONOMY LESSON NO. 2 USING ESL

The teacher may present the study of the nine planets and their positions in relation to the sun by using the attached drawing of the solar system.

1. Repetition Drill

   Teacher: The planet next to the sun is Mercury.
   Student: Repeat

2. Transformation Drill

   Teacher: Which planet is next to the sun?
   Student: Mercury is the planet next to the sun.

Continue the above drills asking individuals, rows, boys, girls, or other specified groups to repeat or answer what the teacher says, using the following facts:

a. Mercury is the planet next to the sun.
b. Venus is the second planet from the sun.
c. Earth is the third planet from the sun.
d. Mars is the fourth planet from the sun.
e. Jupiter is the fifth planet from the sun.
f. Saturn is the sixth planet from the sun.
g. Uranus is the seventh planet from the sun.
h. Neptune is the eighth planet from the sun.
i. Pluto is the ninth or furthest planet from the sun.

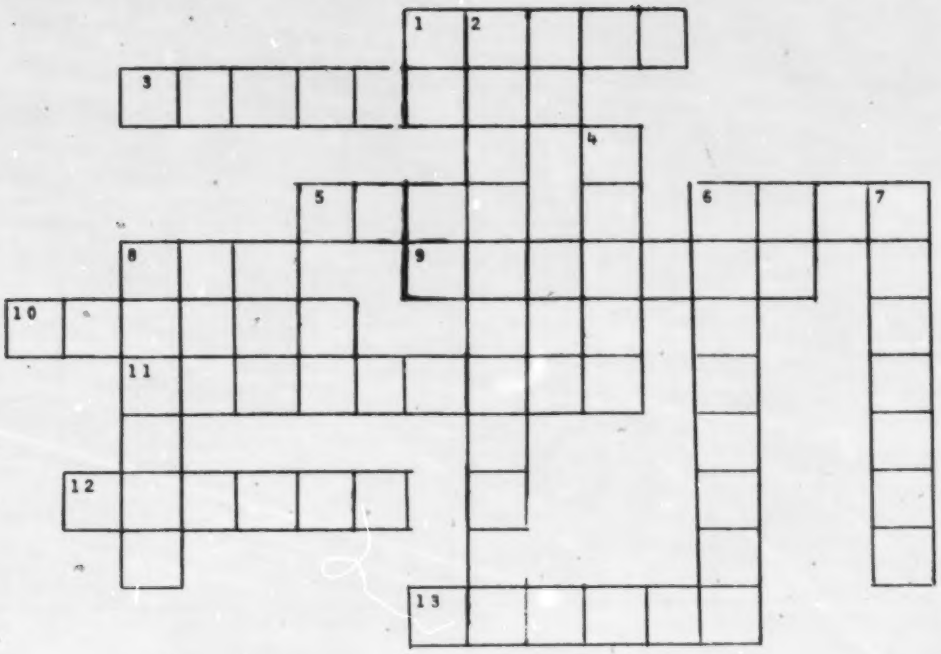
DRAWING OF THE PLANETS

116

140

141

ASTRONOMY CROSSWORD PUZZLE



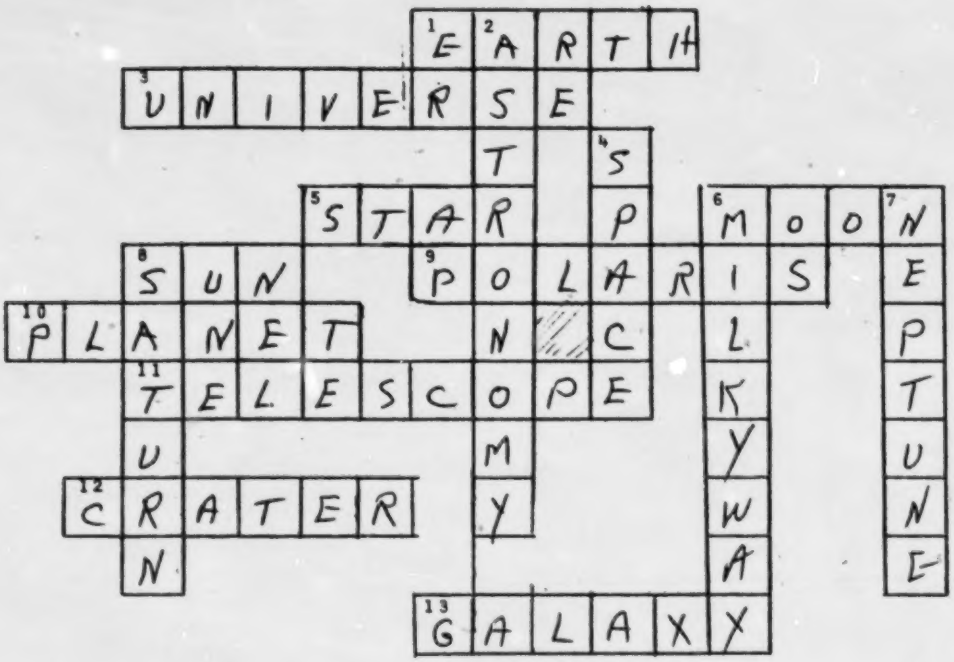
ACROSS

1. Our planet
3. Everything in space
5. Glowing ball of gases
6. Object that orbits around us
8. Main star of our solar system
9. North star
10. Large object revolves around a star
11. Instrument used to study universe
12. Hole on the moon
13. Collection of stars and solar systems

DOWN

2. Study of our solar system
4. Emptiness
6. Our galaxy
7. Planet next to Pluto
8. Planet with a ring of gases

ASTRONOMY CROSSWORD PUZZLE



ACROSS

1. Our planet (Earth)
3. Everything in space (Universe)
5. Glowing ball of gases (Star)
6. Object that orbits around us (Moon)
8. Main star of our solar system (Sun)
9. North star (Polaris)
10. Large object revolves around a star (Planet)
11. Instrument used to study universe (Telescope)
12. Hole on the moon (Crater)
13. Collection stars and solar systems (Galaxy)

DOWN

2. Study of our solar system (Astronomy)
4. Emptiness (Space)
6. Our galaxy (Milky Way)
7. Planet next to Pluto (Neptune)
8. Planet with a ring of gases (Saturn)

SAMPLE ASTRONOMY EXAM

Fill in the blanks:

1. The planet next to Pluto is _____.
2. A glowing ball of gases is_____.
3. An instrument used to study the universe is a _____.
4. The main star in our solar system is the_____.
5. The study of our solar system is_____.
6. The planet next to the sun is_____.
7. The planet furthest from the sun is_____.

114

ANTHROPOLOGY

HUMAN ADAPTATION TO ENVIRONMENT

Level:

Grades 7 - 12

Objectives:

1. Student will be able to name the ways in which certain animals adapt to their environments.

2. Student will be able to discuss human adaptation to environment (physical and cultural).

3. Given visual cues, student will be able to identify certain kinds of adaptive specializations.

4. Student will be able to relate (in oral or written discussion) adaption in their own experience to the material learned.

Level of Communication:

Group

Procedure:

1. Teacher will present information on animal and human adaptation. Depending upon the linguistic needs of the students, the material may be presented in Spanish as well as in English. (Included in this unit are line drawings which can be used as visual reinforcement for the examples and concepts presented. These are appropriate for mounting into slides.)

2. Teacher will distribute copies of the Human Adaptation information sheets for the students to use for review of the basic concepts and terminology.

3. Teacher will have the students relate what they have learned about animal and human adaptations to their own experiences.

   Mexican-American students are frequently from families who maintain ties with Mexico and the Mexican culture or, living in a Spanish-speaking environment, they are familiar with the Mexican stereotype propagated in advertising, entertainment, and much literature.

   Some questions to elicit discussion and understanding of why the stereotypes persist are as follows:

a. What is an appropriate kind of clothing for warm climates? (Light weight and light colored; relate to peasants' clothing.)

b. What kind of hat is appropriate for warm, sunny climates? (A wide-brimmed hat; relate to the sombrero.) Continue relating to such things as clothing (serapes, sandals), housing, etc.

c. What adaptations do we make to our environment? (Gulf coast: clothing, food, air conditioning, housing, etc.)

4. Teacher will use a "lock-in" drill to emphasize some of the concepts presented above.

Groups of 8 to 10 are placed in two concentric circles. The inside group will respond to a question related to adaptation. The outside circle will be expected to listen in order to retain as much as possible of what is being said by the inside group. The second group will be asked to repeat what the first group offered. Then, the two groups switch roles for another round using either the same question or a different one.

Questions appropriate to the activity:

a. Name some specializations animals have developed in adapting to their environments.

b. What are some of the ways in which we adjust to a new cultural environment? (This can be presented more specifically - how does the Mexican adapt to a predominately Anglo society?)

c. What are some of the ways in which humans adapt to their environments?

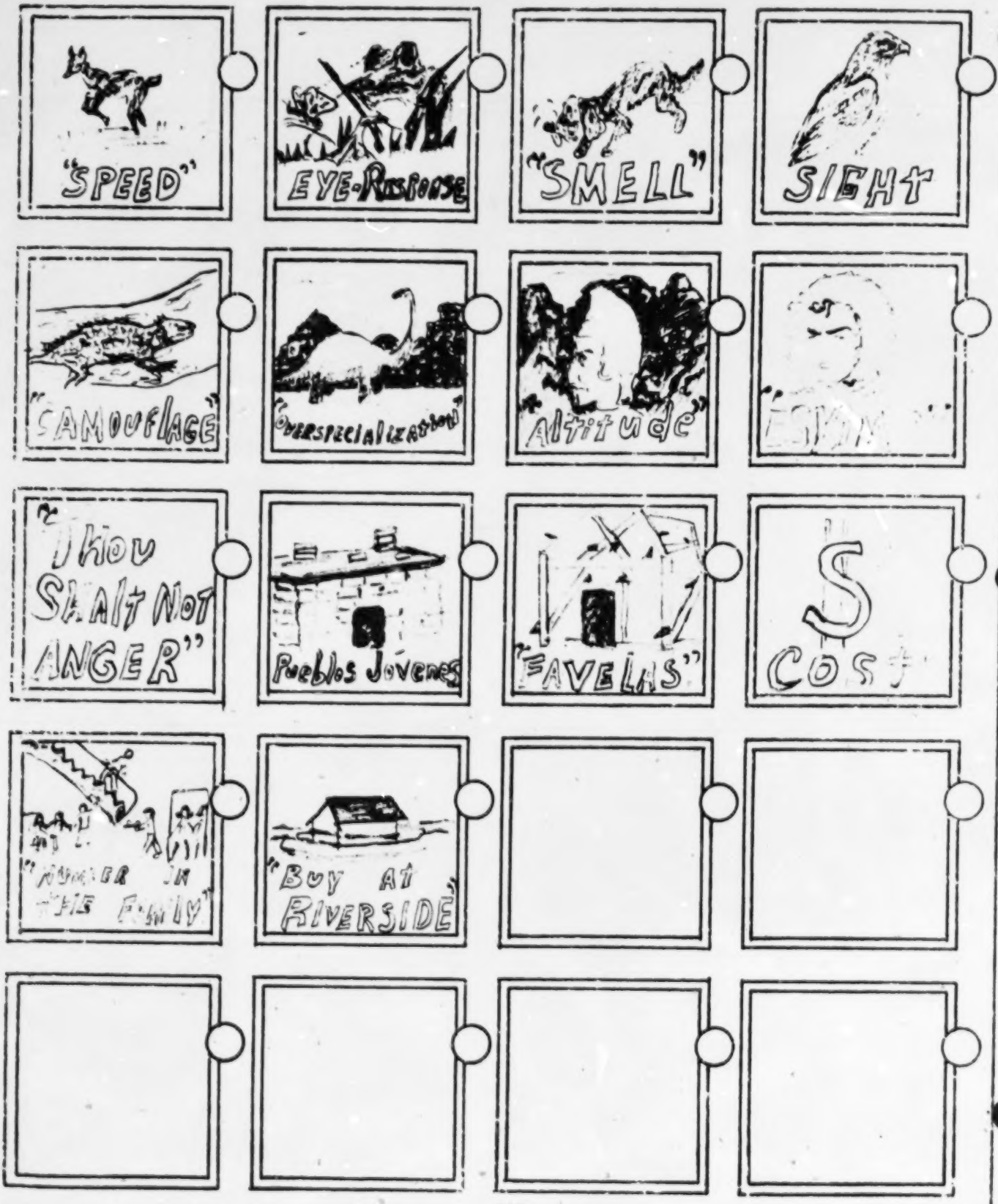
Materials:

Slides or transparencies (made from drawings similar to those included)
Information sheets on basic concepts and terminology relating to human adaptation (English and Spanish)

Evaluation:

Questions similar to the samples shown here may be utilized for evaluation.

PATTERN FOR TRANSPARENCY



HUMAN ADAPTATION

Anthropologists study the many ways that humans adapt to their environments:

Environment - The cultural and natural settings in which humans live.

Adapt - To change something to make life more comfortable, safer, healthier, and/or happier - particularly to change oneself.

In summer cooler clothes are worn than are worn in winter. This is adapting to living in a hot climate. Warm or winter clothes worn in the hot summer would be very uncomfortable and could cause heat exhaustion or other illness.

Specialization - Animals adapt constantly to their environment because environments are always changing. Most animals other than humans adapt by physical specialization, such as acquiring greater ability in one area:

Deer - speed
Frog - eye geared to response
Dog - smell, ability to hunt in packs
Eagle - eyesight
Chameleon - camouflage

How does this happen? Each animal is born slightly different from all others. (Look around you.) Over thousands and thousands of years, those animals with the best eyes, or noses, or ability to work together, or whatever, tend to live longer and to raise more offspring than the others so the stronger, more needed traits become greater and the lesser die out.

Culture - Humans adapt physically, too, but compared with other animals, humans do not do much physical specialization. This is lucky because physical adaptation takes a long time and many species die out before they can adapt sufficiently to their changing environment.

Humans adapt mainly to their environments through cultural changes brought about by the things people do, make, believe, or say, that can be passed on to their children.

Hunters and gatherers who live where there is little food often have kinship systems to allow them to live in groups appropriate to the availability of food supplies.

Eskimos live close together in small groups in the winter. To enable them to live in peace, they have a rule forbidding them to express anger.

Tribes with many enemies have kinship systems that allow them to demand military help from large numbers of warriors.

In tropical places, houses are built with thin walls to allow air to pass through readily.

In Lima, Peru, which is on a fairly cool desert where it rarely rains, pueblos jóvenes are built slowly, a few bricks each year. There is little wood and no hurry to finish.

In Rio de Janeiro, Brazil, where there is a lot of wood and much rain, houses have to be built fast but aren't as sturdy as those built of brick in the pueblos jóvenes.

However, the Ona Indians, who used to live at the tip of South America, and the Kwakiutl Indians, who live on the northwest coast of North America, both lived in cold, rainy climates and depended on fish for most of their food. The Ona built no houses - just little windbreaks - and went naked except for smearing a little grease on themselves. The Kwakiutl built large wooden houses and made beautiful blankets for themselves. How did these two groups with such similar environments manage such different cultural adaptations?

There are many different things in the environment to be adapted to. Think of all the different things that cause the differences in housing in various areas.

Although our ability to adapt to our environments through cultural changes has helped humans survive many difficult situations, an adaptation that is helpful at one time may become a difficulty of an environment eventually.

Some of the factors in our environment that affect the types of houses are:

cost of land	the climate
cost of various materials	government regulations
number in the family	propaganda (commercials)

HUMAN ADAPTATION

Los antropólogos estudian las maneras numerosas en que nosotros humanos nos adaptamos a nuestros ambientes o se puede decir que "bailamos al sonido que se toca."

Ambiente - todas cosas alrededor de nosotros. Cosas naturales y cosas hechas por humanos. También, se puede incluir las acciones de nuestros vecinos.

Adaptar - cambiar algo de si mismos para hacerse más sano, cómodo, feliz o más salvo.

En el verano se usa menos ropa (o ropa más ligera) que en el invierno. Si una persona usa mucha ropa o usa ropa muy pesada en el verano, estaría muy descómodo, y existe la posibilidad que se enfermaría.

Todos animales se adaptan constantemente a sus ambientes porque los ambientes siempre cambian. La mayoría de los animales hacen sus cambios por especialización física.

Especialización - tener la abilidad de hacer solamente una o dos cosas

Ejemplos - Un venado tiene la abilidad de correr muy rápido.

Perros - percepción olfactorio (oler)
Águilas - visión
Camaleon - cambia colores
Rana - captura a los insectos con la lengua automaticamente cuando los ojos ven movimiento

¿En qué manera ocurre este asunto? Cada animal nacido es un poco diferente de cada otro. Después de miles de años, los animales con los ojos y neces mejores, con la abilidad de trabajar en compañía de otros, tienen la tendencia de vivir más años, producir más hijos que los demás. Sus hijos heredan sus ojos, neces, etc.

Nosotros humanos nos adaptamos físicamente, también.

El pueblo quienes han pasado miles de años en zonas selváticas son flacos.

También, hay cambios físicos temporarios o que desaparecen después de una generación. Por ejemplo, a causa de la altura, las indígenas de la sierra andena tienen uno o dos más litros de sangre, pulmones más grandes y de más capaz, y químicos distintos en la sangre que tienen la población de la costa. Pero si viene a la costa un serrano, los químicos cambiarán y la sangre disminuirá. Los pulmones de hijos nacidos en la costa serán normales.

Pero en comparación con otros animales, los humanos se especializan físicamente muy poco. Por eso, tenemos suerte, porque los mayores cambios físicos necesitan mucho tiempo - y lo que pasa es que muchas veces, cuando hay cambio radical (o extremo) en el ambiente, los animales especializandose a aquél ambiente se mueren antes de que pueden readaptarse.

La manera principal en que los humanos se adaptan a sus ambientes es en cambiar sus culturas.

La cultura - para los antropólogos no significa arte y música clásica. Cultura significa todos tipos de cosas que los humanos hacen, creen, o dicen, que puedan pasar a sus hijos.

Ejemplos: Muchos tribus sin agricultura o ganado (cazadores y colectores) quienes viven donde hay poco para comer, tienen una manera de contar parentezco que permite que ellos vivan en grupos pequeños o grandes, depende en cuantos comestibles hay.

Un pueblo de este tipo, los Eskimo, tienen que vivir muy juntos, en grupos pequeños, durante el invierno. Ellos tienen reglas muy fuertes prohibiendo expresiones de enojo. Sin estas reglas, no pudieran vivir tan juntos por tiempos largos.

Las tribus que viven cerca de muchos enemigos muchas veces tienen sistemas de parentezco que permiten que ellos demanden ayuda militar de sus parientes.

Todos estos son adaptaciones culturales al ambiente.

Tipos de casas muchas veces muestran adaptaciones culturales a varios ambientes.

En muchas zonas tropicales, la gente construyen casas con paredes muy delgadas, y con muchas aberturas, para permitir que el aire pase por adentro.

En Lima, Perú, hay ciertas tipos do barrios que se llaman pueblos jóvenes o barriadas. La gente en estos barrios pueden construir casas muy cómodas, con ladrillo y concreto, porque hay poca madera cerca de Lima. Hacen sus casas muy despacio durante el año. Es posible hacer esto porque el clima les permite. La lluvia es rara; así es que ellos pueden vivir en sus casas al mismo tiempo que las están construyendo.

En barrios muy similares en Río de Janeiro, Brazil (que se llama "favelas"), llueve mucho, y así es que tienen que construir sus casas rapidamente. Por eso, los edificios no son bien construídos como los edificios en los pueblos jóvenes de Lima, Perú.

Hay muchas maneras culturales usadas para adaptar a un ambiente.

> Los Ona, indígenas del sur de Sud América, y los Kwakiutl, indígenas de la costa noroeste del Norte América, vivieron en climas fríos, lluviosos, y dependían en el pescado como la forma principal de comida.
>
> Los Onas no construyeron casas. Construyeron solamente unas paredes contra el viento. Salían desnudos en el invierno, pero se ponían manteca sobre la piel. A lo contrario, los Kwakiutl construyeron casas grandes de madera y hicieron mantas hermosas.

¿Cuántos factores en nuestro ambiente afectan los tipos de casas que tenemos?

costo de terreno	el clima
costo de varias materiales	reglas del govierno
miembros de la familia	propaganda

SPACE EXPLORATION

EXPLORACIONES ESPACIALES

Level:

Grades 7 - 12

Objectives:

1. Student will be able to identify and translate, in English and in Spanish, words related to space travel and space technology.

2. Student will be able to choose and fill in appropriate terms in a guided writing activity.

3. Student will be able to write an original narrative using space terminology appropriately.

Level of Communication:

Individual, group

Procedure:

1. Teacher will distribute terminology lists (Spanish/English) to the students.

2. Teacher will say each word (or student will) and students will repeat individually or by group as called on. Each word will be used in isolation and then within the context of a phrase or a sentence. This drill will provide sufficient preparation for the written activities. Sentences should be relatively short and should provide some clue to the meaning. Visuals (posters, slides, filmstrips, photographs) will aid the students in acquiring this vocabulary.

   Some of the craters on the moon are very deep.
   They used the retrorockets to guide the ship.
   The launching site was at Cape Kennedy in Florida.

3. The teacher will have students choose appropriate words from the list to fill in the blanks of a structured narrative:

   The three *astronauts* left *Cape Kennedy* on July 4, 1974. The *rocket* was *launched* at 6:30. The *trajectory* was good and they went into *free flight*. The astronauts had learned to operate all of the *electronic equipment* when they trained at the simulation of the *surface of the moon*. During the trip to the moon, the astronauts felt *weightlessness* in the *capsule*. They made a successful *moon landing* near the *Sea of Tranquility*.

4. The teacher will have students write original narratives having to do with space flight, moon landing, etc., using at least ten of the words from the list of twenty-eight. (The writing activity can be in the form of a dialogue or a skit - in flight, landing on the moon, etc. - which can be presented orally to the class.)

5. Teacher will have students create posters (or other drawings) to illustrate two or three or more of the space terms from the list. These may be used in procedure No. 2.

Materials:

Posters
Photographs
NASA literature and brochures
Filmstrips
Other material which visually represents some facet of space travel

Evaluation:

The activities shown above can be adapted to evaluative procedures.

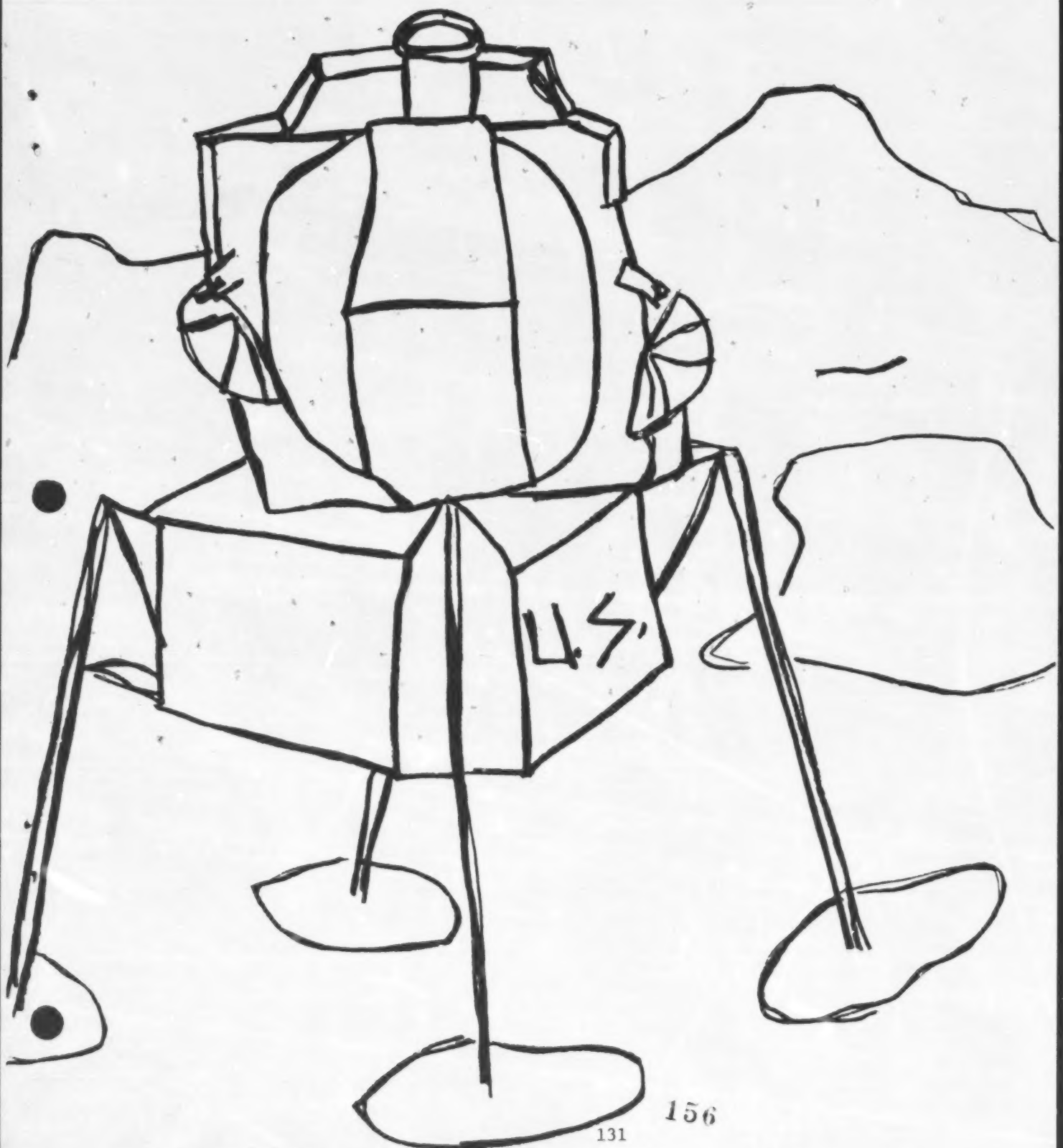
SPACE TERMINOLOGY

TÉRMINOS DE EXPLORACIONES ESPACIALES

1. a missile	1. proyectil
2. a rocket	2. un cohete
3. rocketry	3. cohetería
4. the trajectory	4. la trayectoria
5. the first stage	5. la primera etapa
6. space ship	6. nave espacial
7. it fires again	7. vuelve a incendiar
8. satellite	8. el satélite
9. to put in orbit	9. poner en órbita
10. to launch	10. lanzar, levantar el vuelo
11. the launching site	11. lanzamiento
12. manned vehicle	12. nave tripulada
13. to predict the weather	13. pronosticar el tiempo
14. electronic equipment	14. equipo electrónico
15. free flight	15. vuelo libre
16. craters on the moon	16. cráteres en la luna, lunares
17. to simulate the surface of the moon	17. simular la superficie de la luna
18. weightlessness, gravity	18. ingravidez, gravedad
19. astronauts	19. astronáutas
20. retrorocket	20. retrocohete
21. solid fuel, liquid fuel	21. combustible sólido, líquido
22. to land	22. aterrizar
23. moon travelers	23. selenautas, selenes
24. spacial flights	24. vuelos espaciales
25. capsule	25. cápsula
26. Cape Kennedy	26. Cabo Kennedy
27. Sea of Tranquility	27. Mar de la Tranquilidad
28. moon landing	28. alunizaje

Reference: Barker, Marie Esman, *Español para el bilingüe.*

PATTERN FOR TRANSPARENCY



PATTERN FOR TRANSPARENCY

E.S.L - SCIENCE

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